COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES RESTRICTED
HR02321718

Serial V. 40
A
Columbia University
in the City of New York 1899
copy 1
College of Physicians and Surgeons
Library

Digitized by the Internet Archive
in 2014

https://archive.org/details/transactionsofna3189nati

TRANSACTIONS

OF THE

National Dental Association.

INCLUDING

PROCEEDINGS

OF THE

THIRD ANNUAL SESSION,

Held at Niagara Falls, N. Y.,

COMMENCING AUGUST 1, 1899.

PROCEEDINGS

OF THE SECOND ANNUAL SESSION OF THE

Southern Dental Association—Branch of the National Dental Association,

Held at New Orleans, La.,

COMMENCING FEBRUARY 9, 1899.

PHILADELPHIA:
THE S. S. WHITE DENTAL MFG. CO.
1900.

DISCLAIMER.

The National Dental Association, although formally accepting and publishing the reports of the various Sections, and the Essays read before the Association, holds itself wholly irresponsible for the opinions, theories or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

EX-PRESIDENTS OF THE AMERICAN DENTAL ASSOCIATION.

1859*	W. W. Allport	Chicago, Ill.
1860	W. H. Atkinson	Cleveland, Ohio.
1861	No meeting.	
1862	George Watt	Xenia, Ohio.
1863	W. H. Allen	New York, N. Y.
1864	J. H. McQuillen	Philadelphia, Pa.
1865	C. W. Spalding	St. Louis, Mo.
1866	C. P. Fitch	New York, N. Y.
1867	A. Lawrence	Lowell, Mass.
1868	Jonathan Taft	Cincinnati, Ohio.
1869†	Homer Judd	St. Louis, Mo.
1870	W. H. Morgan	Nashville, Tenn.
1871	Geo. H. Cushing	Chicago, Ill.
1872	P. G. C. Hunt	Indianapolis, Ind.
1873	T. L. Buckingham	Philadelphia, Pa.
1874.	M. S. Dean	Chicago, Ill.
1875	A. L. Northrop	New York, N. Y.
1876	Geo. W. Keely	Oxford, Ohio.
1877	F. H. Rehwinkel	Chillicothe, Ohio.
1878	H. J. McKellops	St. Louis, Mo.
1879	L. D. Shepard	Boston, Mass.
1880	C. N. Peirce	Philadelphia, Pa.
1881	H. A. Smith	Cincinnati, Ohio.
1882	W. H. Goddard	Louisville, Ky.
1883	E. T. Darby	Philadelphia, Pa.
1884	J. N. Crouse	Chicago, Ill.
1885	W. C. Barrett	Buffalo, N. Y.
1886	W. W. Allport	Chicago, Ill.
1887	Frank Abbott	New York, N. Y.
1888	C. R. Butler	Cleveland, Ohio.
1889	M. W. Foster	Baltimore, Md.
1890	A. W. Harlan	Chicago, Ill.
1891	W. W. Walker	New York, N. Y.
1892	J. D. Patterson	Kansas City, Mo.
1893	Formal session only, owing to the holding of the World's Columbian Dental Congress; officers elected in 1892 held over until 1894.	
1894	J. Y. Crawford	Nashville, Tenn.
1895	J. Y. Crawford	Nashville, Tenn.
1896	Jas. Truman	Philadelphia, Pa.

* First meeting, for organization.

† Owing to a change in the Constitution, officers elected at this and the sessions following, served at the next annual meeting subsequent to their election.

EX-PRESIDENTS OF THE SOUTHERN DENTAL ASSOCIATION.

1869*	W. T. Arrington	Memphis, Tenn.
1870	W. T. Arrington	Memphis, Tenn.
1871	Jas. S. Knapp	New Orleans, La.
1872	F. Y. Clark	Savannah, Ga.
1873	H. M. Grant	Abingdon, Va.
1874	Robt. Arthur	Baltimore, Md.
1875	J. R. Walker	New Orleans, La.
1876	W. T. Arrington	Memphis, Tenn.
1877	W. G. Redmond	Louisville, Ky.
1878	S. J. Cobb	Nashville, Tenn.
1879	F. J. S. Gorgas	Baltimore, Md.
1880	J. B. Patrick	Charleston, S. C.
1881	V. E. Turner	Raleigh, N. C.
1882	E. S. Chisholm	Tuscaloosa, Ala.
1883	L. D. Carpenter	Atlanta, Ga.
1884	H. J. McKellops	St. Louis, Mo.
1885	A. O. Rawls	Lexington, Ky.
1886	W. C. Wardlaw	Augusta, Ga.
1887	W. W. H. Thackston	Farmville, Va.
1888	B. H. Catching	Atlanta, Ga.
1889	J. Y. Crawford	Nashville, Tenn.
1890	John C. Storey	Dallas, Texas.
1891	G. F. S. Wright	Georgetown, S. C.
1892	Gordon White	Nashville, Tenn.
1893	B. Holly Smith	Baltimore, Md.
1894	Same officers hold over.	
1895	H. E. Beach	Clarksville, Tenn.
1896	John S. Thompson	Atlanta, Ga.
1897	W. H. Richards	Knoxville, Tenn.
1898†	E. P. Beadles	Danville, Va.

* First meeting for organization; Jas. S. Knapp, Chairman *pro tem.*

† First President of the Southern Dental Association as a branch of the National Dental Association, organized August, 1897, by the consolidation of the American Dental Association and the Southern Dental Association.

CONTENTS.

	PAGE
Disclaimer	ii
Ex-Presidents of the American Dental Association	iii
Ex-Presidents of the Southern Dental Association	iv
Minutes of meeting at Niagara Falls	1
List of members as per Treasurer's books	1
Permanent members without dues	9
Executive Committee's printed program accepted	10
Committee on President's Address	10
Committee on revision of Constitution, report read	10
Dr. Shepard's motion to print carried	10
Committee on History continued and vacancy filled	10
Committee appointed to examine books of Protective Association	11
Report of Publication Committee	11
Report of Treasurer	11
Report of Committee on Appointment of Dentists to the Army and Navy	12
Vote of censure upon New Jersey State Dental Society rescinded	12
Invitation from Niagara Falls Power Company	12
Report of Corresponding Secretary	13
Courtesies of the floor extended to Dr. John E. Grevers, of Amsterdam	13
Invitation from Virginia State Dental Society	13
Report of Section II	13
Resolution regarding papers not having been read in the Sections	14
Consent to Dr. Brophy to read his paper out of the regular order	14
Report of Committee on Credentials	14
Assistant Recording Secretary's report	15
Report (verbal) of Section III	16
Report on President's Address read	17
Communication read, from the Dental Society of the State of New York	17
Records corrected regarding Dr. Shryock's resignation	17
Lantern exhibits offered	17
Report of Committee on Code of Ethics read	17
Resolution condemning politics in State Examining Boards	18
Invitation read from Carborundum Company	18
Report of Committee on Protective Association's books	18
Editors of dental journals added to Committee on Army Dental Surgeon Legislation	19
Instruction to Committee on International Congress	20
Revision of Constitution adopted	20
Committee to organize Section work appointed	23
Organization of Sections	23

PAGE
Dr. Harlan's motion to change time of next meeting..... 25
Resignation of Dr. J. B. Monfort..... 25
Committee on International Relations, asked for by Dr. Bryan of Basle, Switzerland, appointed..... 26
Auditing Committee's report..... 26
Executive Committee authorized to change the place of meeting..... 27
Reports of Sections IX and I referred to Publication Committee.... 26
Report of Section VII referred to Publication Committee..... 27
Motion to meet June 26..... 27
Election of Officers..... 27
Election of Executive Council..... 27
Report of Committee on National Dental Museum and Library ordered printed..... 27
Rule adopted by Section III ordered to be printed with the report.... 28
Motion to change Section 7 of Article XIII..... 28
Rescinding of rule requiring the presentation of two general essays.... 28
Votes of thanks 28
Vote of thanks to Dr. H. J. Burkhart..... 28
Papers not acted upon at this session ordered left over for next year.. 28
Committee on Necrology filled..... 28
Committee on History filled..... 28
Committee appointed on Legislation favoring Dentists in the Army and Navy 29
Notice of proposed amendments to the Constitution..... 30
Publication Committee appointed..... 30
Honorary members..... 31

SPECIAL REPORTS, REPORTS OF SECTIONS, AND VOLUNTARY PAPERS.

Report on History..... 32
Report on Appointment of Dentists to the Army and Navy..... 54
Report of Committee on Museum and Library..... 58
Report on Necrology..... 65
Annual Address 66
Report of Committee on President's Address..... 78

SECTION II.—DENTAL EDUCATION, LITERATURE, AND NOMENCLATURE.

Report by S. H. Guilford, Chairman..... 81
Paper by R. H. Hofheinz, of the Section..... 83
Paper by B. J. Cigrand, of the Section..... 98
Paper by Wm. Ernest Walker, of the Section..... 110
Paper by J. A. Chapple, of the Section..... 118
Paper by C. Edmund Kells, Jr., of the Section..... 121

SECTION III.—OPERATIVE DENTISTRY.

Report by J. Y. Crawford, Chairman..... 140
Voluntary paper, by N. S. Jenkins..... 142
Paper by J. N. Crouse, of the Section..... 157

PAGE
Paper by E. K. Wedelstaedt, of the Section..... 177
Paper by W. V-B. Ames, of the Section..... 187
Paper by G. V. Black, of the Section..... 196
Paper by C. N. Johnson, of the Section..... 211
Paper by James Truman, from Section VII..... 222
Paper by S. B. Palmer, of the Section..... 256

General Address by L. E. Custer..... 260

Section IV.—Histology and Microscopy.

Paper by Joseph Head, of the Section..... 273
Paper by H. T. Harvey, of the Section..... 277

Section V.—Materia Medica and Therapeutics.

Paper by D. D. Smith, of the Section..... 287
Paper by Charles L. Hungerford, from Section VI..... 295
Paper by A. W. Harlan, of the Section..... 307
Paper by W. E. Griswold, of the Section..... 313

Section VI.—Physiology and Etiology.

Report by J. D. Patterson, Chairman..... 316
Paper by Alton H. Thompson, of the Section..... 322

Section VII.—Anatomy, Pathology, and Surgery.

Report by W. C. Barrett, Chairman..... 329
Paper by Truman W. Brophy, of the Section..... 334
Paper by Thomas Fillebrown, of the Section..... 343
Paper by M. H. Cryer, of the Section..... 349
Paper by Geo. V. I. Brown, of the Section..... 383

Section IX.—Orthodontia.

Report by V. H. Jackson, Chairman..... 397
Paper by Rodrigues Ottolengui, of the Section..... 398
Paper by E. A. Bogue, of the Section..... 423

Section I.—Prosthetic Dentistry, Chemistry, and Metallurgy.

Report by Joseph Head, Chairman..... 461
Paper by Robert H. Nones, of the Section..... 463
Paper by W. Warrington Evans, of the Section..... 473

Code of Ethics..... 481

Standing Resolutions..... 484

DISCUSSIONS.

Preliminary Education—discussed by

Dr. James Truman..... 91
Dr. Black..... 91
Dr. Sitherwood..... 92, 94, 95
Dr. Brophy..... 92
Dr. C. N. Johnson..... 93, 94
Dr. Newkirk..... 94, 95
Dr. B. Holly Smith..... 95
Dr. Hofheinz..... 96

PAGE

Dental History—discussed by

Dr. Chas. McManus..... 105
Dr. Ambler..... 105
Dr. Barrett..... 107
Dr. Black..... 108
Dr. Cigrand..... 108

Porcelain Enamel Inlays—discussed by

Dr. John I. Hart..... 147
Dr. E. T. Darby..... 149
Dr. C. N. Johnson..... 150
Dr. Head..... 151
Dr. George Evans..... 153
Dr. McKellops..... 154
Dr. Ottolengui..... 154
Dr. Jenkins..... 155

Important Changes in Dentistry—discussed by

Dr. S. B. Palmer..... 167
Dr. Black..... 168, 175
Dr. Crawford..... 170
Dr. McKellops..... 172
Dr. Noble..... 173
Dr. Barrett..... 173
Dr. Crouse..... 175, 176

Cements—discussed by

Dr. C. N. Johnson..... 185, 186
Dr. Black..... 192
Dr. Patterson..... 193
Dr. Wedelstaedt..... 186, 193, 194
Dr. Crouse..... 194
Dr. Ames..... 194

Dr. Black's and Dr. Johnson's papers—discussed by

Dr. McKellops..... 230, 245
Dr. Bryan..... 230
Dr. S. B. Palmer..... 231
Dr. Corydon Palmer..... 234
Dr. W. H. Jackson, of Ann Arbor, Mich..... 237
Dr. Laurence Leonard..... 237
Dr. Hofheinz..... 238, 248, 249
Dr. Black..... 239, 253
Dr. Crouse..... 239
Dr. Crawford..... 239
Dr. B. Holly Smith..... 241
Dr. Newkirk..... 242
Dr. E. T. Darby..... 243
Dr. Bogue..... 244, 251
Dr. Harlan..... 246
Dr. Sitherwood..... 248, 249
Dr. Vann..... 249
Dr. Ames..... 250
Dr. Conrad..... 253

Physiological Relation of Dental Pulp—discussed by

Dr. Rhein..... 299
Dr. Black..... 300, 301, 302
Dr. D. D. Smith..... 301, 302, 304
Dr. Hungerford..... 306

Radical Cure of Cleft Palate—discussed by

Dr. Barrett..... 339
Dr. Brophy..... 342
Dr. Cryer..... 342

Treatment of Prognathism—discussed by

Dr. Guilford..... 414, 416
Dr. Ottolengui.... 416, 419, 420
Dr. Rhein..... 419

MINUTES OF TRANSACTIONS

OF THE

NATIONAL DENTAL ASSOCIATION,

SESSION OF 1899.

BY GEO. H. CUSHING, SECRETARY.

FIRST DAY—MORNING MEETING.

THE NATIONAL DENTAL ASSOCIATION commenced its second annual session in the Ball-room of the International Hotel, Niagara Falls, N. Y., at 11 A.M. on Tuesday, August 1, 1899; the President, Dr. H. J. Burkhart, of Batavia, N. Y., in the chair.

Prayer was offered by Rev. Albert S. Bacon.

Calling the roll and reading of minutes were dispensed with.

Following is the list of members according to the Treasurer's books:

ADAMS, J. FRANK.....325 College st., Toronto, Ontario, Can.
ALBRECHT, MAURICE.....61 Ingalls Block, Indianapolis, Ind.
*ALEXANDER, C. L..... 7 South Tryon st., Charlotte, N. C.
*ALLEN, H. JEROME.....421 H st., N. E., Washington, D. C.
ALLEN, T. M.....Box 718, Birmingham, Ala.
AMBLER, H. L.....176 Euclid ave., Cleveland, Ohio.
AMES, F. LEGRAND.....63 Washington st., Albany, N. Y.
AMES, W. V-B.....36 Washington st., Chicago, Ill.
*d*ANGLE, E. H.....St. Louis, Mo.
*ARCHINARD, L. D.....907 Dauphine st., New Orleans, La.
*AULT, MILTON F.....1204 College ave., Indianapolis, Ind.
BABCOCK, C. L.....50 Colby & Abbott Bldg., Milwaukee, Wis.
*BARBER, L. L.....508-10 Spitzer Bldg., Toledo, O.

*Those marked thus (*) were not present, but sent their dues. Those marked thus (*d*) were delegates, but not permanent members.

Barnes, C. H. ..... 115 E. Jefferson st., Syracuse, N. Y.
Barnes, Henry ..... 1415 New England Bldg., Cleveland, O.
Barrett, W. C. ..... 208 Franklin st., Buffalo, N. Y.
*Bauer, Joseph ..... 1026 Esplanade, New Orleans, La.
*Beach, H. E. ..... Clarksville, Tenn.
*Beach, John R. ..... Clarksville, Tenn.
Beadles, E. P. ..... Danville, Va.
*Benton, J. H. ..... 65 Pollock st., Newberne, N. C.
Bethel, L. P. ..... Kent, Ohio.
Black, G. V. ..... Madison and Franklin sts., Chicago, Ill.
*Bland, C. A. ..... Charlotte, N. C.
*Bland, M. A. ..... Charlotte, N. C.
Boardman, Waldo E. ..... 184 Boylston st., Boston, Mass.
Bogue, E. A. ..... 63 W. 48th st., New York, N. Y.
*Bollinger, P. S. ..... 5th and Ludlow sts., Dayton, O.
Boozer, D. L., Jr. ..... Newberry, S. C.
Boozer, J. E. ..... 1515 Main st., Columbia, S. C.
Brabson, B. D. ..... Willcox Bldg., Knoxville, Tenn.
*Brackett, C. A. ..... 102 Touro st., Newport, R. I.
Brophy, Truman W. ..... 1405 Champlain Bldg., Chicago, Ill.
Brown, A. J. ..... 912 14th st., N. W., Washington, D. C.
Brown, G. V. I. ..... Milwaukee Med. Coll., Milwaukee, Wis.
*Buckley, W. H. ..... 510½ Main st., Little Rock, Ark.
Burkhart, H. J. ..... Batavia, N. Y.
Burkhart, W. E. ..... 930 Pacific ave., Tacoma, Wash.
Butler, C. S. ..... 680 Main st., Buffalo, N. Y.
Canady, J. W. ..... 283 State st., Albany, N. Y.
Carr, Wm. ..... 35 W. 46th st., New York, N. Y.
*Case, C. S. ..... 708 Stewart Bldg., Chicago, Ill.
Cassidy, J. S. ..... 732 Madison ave., Covington, Ky.
Chapple, J. A. ..... Atlanta, Ga.
Chase, Emma Eames ..... 3334 Washington ave., St. Louis, Mo.
Chase, W. G. ..... 1018 Witherspoon Bldg., Philadelphia, Pa.
Chittenden, C. C. ..... 21 W. Main st., Madison, Wis.
Cigrand, B. J. ..... 1242 Milwaukee ave., Chicago, Ill.
Clancy, D. W. ..... 437 W. 7th st., Cincinnati, Ohio.
*Clapp, Dwight M. ..... 130 Commonwealth ave., Boston, Mass.
*Clements, G. B. ..... Macon, Miss.
*Clifton, W. R. ..... 59-61 Provident Bldg., Waco, Texas.
*Cockerille, S. J. ..... 1340 I st., N. W., Washington, D. C.
Cogan, W. N. ..... 1754 M st., N. W., Washington, D. C.
Collins, J. H. ..... Granville, N. Y.
*Combs, J. W. ..... New Braunfels, Texas.
*Comegys, E. F. ..... Gainesville, Texas.
Conrad, Wm. ..... 321 North Grand ave., St. Louis, Mo.

*Conway, J. R. ..... Worthington, Minn.
*Cook, C. D. ..... 162 Remsen st., Brooklyn, N. Y.
Cook, S. B. ..... Laneman Bldg., Chattanooga, Tenn.
*Corley, J. P. ..... Greensboro, Ala.
*Cowardin, L. M. ..... 407 E. Main st., Richmond, Va.
Crawford, J. Y. ..... Jackson Bldg., Nashville, Tenn.
Crouse, J. N. ..... 2231 Prairie ave., Chicago, Ill.
Cryer, M. H. ..... Crozer Bldg., Philadelphia, Pa.
Culver, M. B. ..... 1529 Locust st., Philadelphia, Pa.
Curtis, G. Lenox ..... 7 W. 58th st., New York, N. Y.
Custer, L. E. ..... 28 E. 3d st., Dayton, Ohio.
Darby, E. T. ..... 1513 Walnut st., Philadelphia, Pa.
*Davenport, I. B. ..... 30 Rue de l'Opera, Paris, France.
*Dewey, S. B. ..... 29 Euclid ave., Cleveland, Ohio.
Dickinson, W. P. ..... Dayton Bldg., Minneapolis, Minn.
*Dixon, Southall ..... Bolivar, Tenn.
Donnally, Williams ..... 1022 14th st., N. W., Washington, D. C.
*Dorward, W. N. ..... 1 W. 102d st., New York, N. Y.
*Dotterer, L. P. ..... 102 Broad st., Charleston, S. C.
*Duff, Samuel G. ..... Greeneville, Texas.
*Dunbar, L. L. ..... 606 Sutter st., San Francisco, Cal.
*Dunn, J. Austin ..... 901 Marshall Field Bldg., Chicago, Ill.
*Eaton, A. R. ..... Elizabeth, N. J.
Eberle, Edward ..... 26 Pratt st., Hartford, Conn.
*Elliott, W. St. Geo. ..... 651 Madison ave., New York, N. Y.
*Essig, Chas. J. ..... 1700 Locust st., Philadelphia, Pa.
Evans, George ..... 55 W. 39th st., New York, N. Y.
Evans, W. W. ..... 1756 M st., N. W., Washington, D. C.
Everitt, D. E. ..... Raleigh, N. C.
Faught, L. Ashley ..... 1415 Walnut st., Philadelphia, Pa.
Ferris, H. C. ..... 1108 Bergen st., Brooklyn, N. Y.
Field, Geo. L. ..... 4 Adams ave., W., Detroit, Mich.
*Fife, J. G. ..... Dallas, Texas.
Fillebrown, Thos. ..... 157 Newbury st., Boston, Mass.
Finley, M. F. ..... 1928 I st., N. W., Washington, D. C.
*Finney, W. B. ..... 813 Hamilton Terrace, Baltimore, Md.
Flanagan, A. J. ..... 352 Main st., Springfield, Mass.
*Foret, A. J. ..... Medical Bldg., New Orleans, La.
Foster, M. W. ..... 9 W. Franklin st., Baltimore, Md.
Foster, S. W. ..... Inman Bldg., Atlanta, Ga.
*Frazier, J. E. ..... Box 524, Birmingham, Ala.
*Freeman, S. ..... 965 Madison ave., New York, N. Y.
Freeman, S. A. ..... 641 Main st., Buffalo, N. Y.
Fruth, O. J. ..... 3066 Hawthorne Boul., St. Louis, Mo.
Fuller, A. H. ..... 8th and Locust sts., St. Louis, Mo.
Fundenberg, W. H. ..... Lewis Bldg., Pittsburg, Pa.

Gallup, Mary E. ..... 711 Boylston st., Boston, Mass.
Gardiner, Frank H. ..... 843 31 Washington st., Chicago, Ill.
Gaylord, E. S. ..... 63 Trumbull st., New Haven, Conn.
*Gilbert, S. E. ..... 1627 Columbia ave., Philadelphia, Pa.
Gilmer, Thos. L. ..... 923 31 Washington st., Chicago, Ill.
*Goddard, C. L. ..... 406 Sutter st., San Francisco, Cal.
*Goldsmith, S. L. ..... 129 E. 60th st., New York, N. Y.
Good, Robt. ..... 126 State st., Chicago, Ill.
*Goodwin, N. J. ..... 275 Main st., Hartford, Conn.
Gore, A. P. ..... 1006 Madison ave., Baltimore, Md.
*Goslee, H. J. ..... 571 Madison ave., Chicago, Ill.
Graham, W. C. ..... Columbian Block, Lancaster, Ohio.
Grant, W. E. ..... 419 W. Chestnut st., Louisville, Ky.
*Gregory, Frank G. ..... 7 W. Park st., Newark, N. J.
*Grindall, Chas. S. ..... 421 N. Charles st., Baltimore, Md.
Griswold, W. E. ..... Mack Bldg., Denver, Col.
Gross, O. J. ..... 77 Ferry st., Schenectady, N. Y.
Guilford, S. H. ..... 1728 Chestnut st., Philadelphia, Pa.
*Hacker, Thos. S. ..... Willoughby Bldg., Indianapolis, Ind.
Hall, J. A. ..... Collinsville, Ala.
*Hardy, Chas. S. ..... Summit, N. J.
*Hardy, Geo. E. ..... Madison and Franklin sts., Baltimore, Md.
Harlan, A. W. ..... 1000 Masonic Temple, Chicago, Ill.
*Harris, James H. ..... 857 N. Eutaw st., Baltimore, Md.
Hart, J. I. ..... 118 W. 55th st., New York, N. Y.
Hart, R. J. ..... 57 W. Milwaukee st., Janesville, Wis.
*Hawes, Earl P. ..... 248 Weybosset st., Providence, R. I.
*Hayward, T. T. ..... Oneida Bldg., Minneapolis, Minn.
Head, Joseph ..... 1415 Walnut st., Philadelphia, Pa.
Heise, O. N. ..... 16 Garfield Place, Cincinnati, Ohio.
*Hinkins, J. E. ..... 131 53d st., Chicago, Ill.
Hinman, Thos. P. ..... Inman Bldg., Atlanta, Ga.
*Hitch, D. M. ..... 3315 Baring st., Philadelphia, Pa.
Hoff, N. S. ..... Ann Arbor, Mich.
Hofheinz, R. H. ..... 138 E. Main st., Rochester, N. Y.
Holbrook, C. W. F. ..... 2 Saybrook Place, Newark, N. J.
Holland, Frank ..... 24 Whitehall st., Atlanta, Ga.
How, W. Storer ..... Chestnut, cor. 12th st., Philadelphia, Pa.
Hoysradt, G. W. ..... Ithaca, N. Y.
*Huey, Robt. ..... 330 S. 15th st., Philadelphia, Pa.
*Huffman, Lee F. ..... 1 Nat. Bank Bldg., Lexington, Ky.
*Hull, H. A. ..... Lock Box 74, New Brunswick, N. J.
Hungerford, C. L. ..... 429 Deardorff Bldg., Kansas City, Mo.
Hunt, A. O. ..... 1000 Masonic Temple, Chicago, Ill.
Hunt, Geo. E. ..... 120 S. Capitol ave., Indianapolis, Ind.

*Hurlbut, J. S. ..... 115 State st., Springfield, Mass.
*Inglis, C. S. ..... Paterson, N. J.
*Jack, Louis ..... 1533 Locust st., Philadelphia, Pa.
Jackman, W. T. ..... 230 Colonial Arcade, Cleveland, Ohio.
Jackson, H. H. ..... 317 Jefferson ave., Detroit, Mich.
Jackson, Victor H. ..... 240 Lenox ave., New York, N. Y.
Jackson, Walter H. ..... 39 E. Liberty st., Ann Arbor, Mich.
*Jameson, G. L. S. ..... 1517 Walnut st., Philadelphia, Pa.
Jarvie, Wm. ..... 105 Clinton st., Brooklyn, N. Y.
*Jefferis, C. R. ..... 1016 Delaware ave., Wilmington, Del.
Jewett, H. R. ..... 313 "The Arcade," Atlanta, Ga.
Johnson, C. N. ..... 30 Washington st., Chicago, Ill.
Johnson, Geo. E. ..... 35 Washington boul., Fort Wayne, Ind.
Johnson, H. H. ..... 306 2d ave., Macon, Ga.
*Johnson, S. W. ..... Navasota, Texas.
*Johnson, S. W. ..... Fayetteville, Ark.
*Johnstone, A. P. ..... Anderson, S. C.
*Jones, Daniel A. ..... 746 Chapel st., New Haven, Conn.
*Jones, Hy. C. ..... 915½ Main st., Richmond, Va.
Jones, Victor S. ..... Bethlehem, Pa.
Kells, C. Edmund, Jr. ..... Medical Bldg., New Orleans, La.
Kennerly, J. H. ..... Chemical Bldg., St. Louis, Mo.
Keppy, F. B. ..... 62 Hancock st., Brooklyn, N. Y.
*Kettig, Edw. M. ..... 319 W. Walnut st., Louisville, Ky.
*Kibler, E. N. ..... Prosperity, S. C.
*King, A. B. ..... 1405 E. Baltimore ave., Baltimore, Md.
*King, H. T. ..... Fremont, Neb.
Kirk, Edward C. ..... Chestnut, cor. 12th st., Philadelphia, Pa.
*Knapp, J. Rollo ..... 620 Canal st., New Orleans, La.
Knapp, Miland A. ..... 2410 Central ave., Minneapolis, Minn.
*Knowles, Samuel E. ..... Cor. Stockton and Geary sts., San Francisco, Cal.
Leonard, L. P. ..... Waseca, Minn.
LeRoy, Louis C. ..... 6 Lexington ave., New York, N. Y.
Libbey, J. A. ..... 524 Penn ave., Pittsburg, Pa.
Lippincott, J. Thos. ..... 1433 Walnut st., Philadelphia, Pa.
Litch, W. F. ..... 1507 Walnut st., Philadelphia, Pa.
*Loetzerich, John D. ..... Pine Bluff, Ark.
Logan, W. H. G. ..... 785 Winthrop ave., Chicago, Ill.
*d*Low, F. W. ..... 680 Main st., Buffalo, N. Y.
Lowe, Geo. A. ..... Rockport, Mass.
*Luckie, R. K. ..... Box 21, Holly Springs, Miss.
Luckey, B. F. ..... 182 Main st., Paterson, N. J.
Lyman, A. E. ..... Melbourne, Fla.
Maercklein, B. G. ..... 411 Mathew Bldg., Milwaukee, Wis.
Maercklein, R. E. ..... Iron Block, Milwaukee, Wis.

*Marshall, J. S. ..... Venetian Bldg., Chicago, Ill.
*Marshall, W. H. ..... Little Rock, Ark.
Martin, G. S. ..... Toronto Junction, Ontario, Can.
*Martin, W. T. ..... Yazoo City, Miss.
Mason, Melville A. ..... 26 W. Wayne, Fort Wayne, Ind.
*Mason, Wm. G. ..... 504½ Franklin st., Tampa, Fla.
Maynard, F. J. ..... P. O. Box 98, Englewood, N. J.
Melendy, A. R. ..... 126½ Oak st., Knoxville, Tenn.
Menges, Theo. ..... Cor. Franklin st. and Madison ave., Chicago, Ill.
*Merchant, M. S. ..... Giddings, Texas.
*Mermilloid, Chas. ..... 213 N. Rampart st., New Orleans, La.
*Merriman, A. F., Jr. ..... 1003½ Broadway, Oakland, Cal.
Miller, Herbert C. ..... 608 Oregonian Bldg., Portland, Ore.
Molyneaux, Grant ..... Cor. 7th and Elm sts., Cincinnati, O.
*Moore, J. Hall ..... 104 N. 9th st., Richmond, Va.
Moore, T. T. ..... 1420 Main st., Columbia, S. C.
Morgan, Henry W. ..... 211 N. High st., Nashville, Tenn.
*Murlless, F. T. ..... Windsor Locks, Conn.
*McAnnally, F. H. ..... Jasper, Ala.
McBrair, H. H. ..... Middletown, N. Y.
McDonald, A. J. ..... 205 E. 12th st., Kansas City, Mo.
*McDonald, J. P. ..... Shelbyville, Tenn.
McFadden, H. B. ..... 3505 Hamilton st., Philadelphia, Pa.
*McKee, S. H. ..... Americus, Ga.
McLean, W. T. ..... Glenn Bldg., Cincinnati, Ohio.
McManus, Chas ..... 80 Pratt st., Hartford, Conn.
*McManus, Henry ..... 80 Pratt st., Hartford, Conn.
McManus, James ..... 80 Pratt st., Hartford, Conn.
McQuillen, Dan'l N. ..... 1516 Locust st., Philadelphia, Pa.
Nason, Geo. S. ..... 446 Bee Bldg., Omaha, Neb.
*Nelson, J. J. ..... 330 S. 15th st., Philadelphia, Pa.
Newkirk, Garrett ..... Marshall Field Bldg., Chicago, Ill.
Noble, H. B. ..... 1324 New York ave., Washington, D. C.
Noel, L. G. ..... Church st., Nashville, Tenn.
Nones, Robt. H. ..... 1708 Chestnut st., Philadelphia, Pa.
*Northrop, A. L. ..... 57 W. 49th st., New York, N. Y.
*Noyes, Edmund ..... 1109 Stewart Bldg., Chicago, Ill.
*Ottofy, Louis ..... 87 Main st., Yokohama, Japan.
Ottolengui, R. ..... 115 Madison ave., New York, N. Y.
*Page, W. E. ..... 16 Arlington ave., Boston, Mass.
Parker, F. W. ..... 400 E. Capitol st., Washington, D. C.
*Parr, H. A. ..... 38 W. 34th st., New York, N. Y.
Patterson, J. D. ..... Keith & Perry Bldg., Kansas City, Mo.
Peck, A. H. ..... Stewart Bldg., Chicago, Ill.
*Peirce, C. N. ..... 1415 Walnut st., Philadelphia, Pa.
*Perry, S. G. ..... 46 W. 37th st., New York, N. Y.

Pfeiffer, Josephine D. ..... 1003 Masonic Temple, Chicago, Ill.
*Pressy, J. B. ..... Hampton, Va.
*Price, W. A. ..... 2238 Euclid ave., Cleveland, Ohio.
*Prosser, A. J. ..... 3109 Olive st., St. Louis, Mo.
*Pruyn, C. P. ..... Room 1312, 100 State st., Chicago, Ill.
*Reavis, J. L. ..... Le Grand, Ore.
*Reitz, R. B. ..... 224 E. 58th st., New York, N. Y.
*Remington, F. A. ..... 57 W. 49th st., New York, N. Y.
Rhein, Meyer L. ..... 38 E. 61st st., New York, N. Y.
*Richter, R. G. ..... 128 Wisconsin st., Milwaukee, Wis.
Roberts, H. E. ..... 1516 Locust st., Philadelphia, Pa.
*Roberts, Norman J. ..... Waukegan, Ill.
*Rohland, C. B. ..... 123 3d st., Alton, Ill.
*Rush, R. A. ..... 12 St. Joseph st., Mobile, Ala.
*Rutledge, B. ..... Lock Box 45, Florence, S. C.
*Sanger, R. M. ..... 551 Main st., East Orange, N. J.
*Sarrazin, J. J. ..... 828 Canal st., New Orleans, La.
Savage, Geo. E. ..... 578 Main st., Worcester, Mass.
Schmidt, John A. ..... 1195 Deane st., Brooklyn, N. Y.
*Seals, R. D. ..... Fort Smith, Ark.
Seip, Howard S. ..... Walnut and Hall sts., Allentown, Pa.
Shepard, L. D. ..... 330 Dartmouth st., Boston, Mass.
*Shriver, H. W. ..... 15th and Farnam, Omaha, Neb.
Shryock, Wm. W. ..... 27 W. Berry st., Fort Wayne, Ind.
Sibley, A. H. ..... 1214 Filbert st., Philadelphia, Pa.
Sill, Chas. ..... 301 W. 12th st., New York, N. Y.
*Simpson, Isaiah ..... Rock Hill, S. C.
Sitherwood, G. D. ..... 118 W. Washington st., Bloomington, Ill.
Smith, B. Holly ..... 1007 Madison ave., Baltimore, Md.
Smith, D. D. ..... 1629 Walnut st., Philadelphia, Pa.
*Smith, Eugene H. ..... 283 Dartmouth st., Boston, Mass.
Smith, H. A. ..... 116 Garfield Place, Cincinnati, Ohio.
Smith, H. T. ..... 116 Garfield Place, Cincinnati, Ohio.
*Smith, L. A. ..... Box 42, Port Gibson, Miss.
Smith, M. C. ..... Room 3, Lee Hall, Lynn, Mass.
Smith, W. Scott ..... 227 W. Chestnut st., Louisville, Ky.
Smith, W. W. ..... Penn Yan, N. Y.
Stainton, C. W. ..... 47 N. Pearl st., Buffalo, N. Y.
Starr, A. R. ..... 8 E. 92d st., New York, N. Y.
*Stephan, J. F. ..... 29 Euclid ave., Cleveland, Ohio.
*Stevens, B. Q. ..... Main st. and Broadway, Hannibal, Mo.
*Stockton, C. S. ..... 17 W. Park st., Newark, N. J.
*Storer, J. W. ..... Exchange Bank Bldg., Wheeling, W. Va.
Straight, M. B. ..... 80 W. Huron st., Buffalo, N. Y.

SUTPHEN, H. S.....24 E. Kinney st., Newark, N. J.
TALBOTT, ROBT. W.....1111 F st., N. W., Washington, D. C.
TAYLOR, L. S.....68 Pratt st., Hartford, Conn.
TEMPLETON, J. G.....435 Pennsylvania ave., Pittsburg, Pa.
*THACKSTON, W. W. H.....Farmville, Va.
*THOMAS, J. D.....1112 Walnut st., Philadelphia, Pa.
THOMPSON, HENRY C.....1113 Pennsylvania ave., N. W., Washington, D. C.
TILESTON, H. B.....433 4th ave., New Equitable Bldg., Louisville, Ky.
TOWNSEND, A. F.....11 Pleasant st., Worcester, Mass.
TRUMAN, JAS.....4505 Chester ave., W. Philadelphia, Pa.
TUCKER, E. J.....Roxboro, N. C.
*TURNER, V. E.....107½ Fayetteville st., Raleigh, N. C.
VAN DE WATER, J. N.....Madison, N. J.
VANN, GEO. S.....Gadsden, Ala.
VAN VLECK, CHAS. K.....536 Warren st., Hudson, N. Y.
*VIGNES, C. V.....Canal and Royal sts., New Orleans, La.
*WALKER, J. L.....29 Grundy st., Norfolk, Va.
WALKER, W. E.....Box 51, Pass Christian, Miss.
WALKER, W. W.....58 W. 50th st., New York, N. Y.
*WARREN, GEO. W.....1338 Walnut st., Philadelphia, Pa.
WASSALL, J. W.....711 92 State st., Chicago, Ill.
WATERS, T. S.....756 N. Eutaw st., Baltimore, Md.
WATKINS, S. C. G.....Montclair, N. J.
WEBSTER, A. E.....93 College st., Toronto, Ont., Can.
WEEKS, THOS. E.....Dayton Bldg., Minneapolis, Minn.
*WENDEL, W. C.....708 Goldsmith Bldg., Milwaukee, Wis.
*WEST, THOS. C.....Natchez, Miss.
WHEELER, HERBERT L.....518 Main st., Worcester, Mass.
WHITBY, T. P.....Vaughn Bldg., Selma, Ala.
WHITE, GORDON.....Church st., Nashville, Tenn.
WHITE, W. A.....Phelps, N. Y.
*WHITFIELD, GEO. M.....216 S. 6th st., Newark, N. J.
WHITSLAR, W. H.....29 Euclid ave, Cleveland, Ohio.
WILKINSON, JNO. E.....402 Sherbourne st., Toronto, Ont., Can.
WILLIAMS, B. H.....Way Cross, Ga.
*WILLIAMS, JACOB L.....4 Walnut st., Boston, Mass.
WILLMOTT, W. E.....41 Shuter st., Toronto, Ont., Can.
*WILSON, F. C.....114½ Jones st., Savannah, Ga.
WILSON, GEO. H.....44 Euclid ave., Cleveland, Ohio.
WILSON, I. P.....317 N. 4th st., Burlington, Iowa.
*WILSON, P. J.....2 Nassau st., Princeton, N. J.
*WISE, J. D.....West Point, Miss.
*WOOD, F. L.....Roanoke, Va.
*WOOD, WALLACE, JR.....629 Canal st., New Orleans, La.

Wright, A. M. ..... 83 3d st., Troy, N. Y.
*Wright, B. E. ..... Dekum Bldg., Portland, Ore.
*Wright, P. H. ..... Oxford, Miss.
*Wright, W. R. ..... 32½ Capitol st., Jackson, Miss.
Young, H. Newton ..... Wilkes-Barre, Pa.
*Younger, W. J. ..... The Auditorium, Chicago, Ill.

PERMANENT MEMBERS, WITHOUT DUES.

The following members are "permanent without payment of dues," under Standing Resolution No. 10, by virtue of having been in reputable practice for a period of fifty years:

Cushing, Geo. H. ..... Temple Block, Los Angeles, Cal.
Fundenberg, W. F. ..... Lewis Bldg., Pittsburg, Pa.
Holmes, Ezra S. ..... 103 Atlanta st., Grand Rapids, Mich.
Morgan, W. H. ..... 211 N. High st., Nashville, Tenn.
McKellops, H. J. ..... 3548 Lindell ave., St. Louis, Mo.
Palmer, Corydon ..... Warren, Ohio.
Palmer, S. B. ..... 225 S. Warren st., Syracuse, N. Y.
Taft, J. ..... Berkshire Bldg., Cincinnati, Ohio.

The following surviving charter members of the Southern Dental Association are "permanent members without dues":

Arrington, B. F. ..... Goldsboro, N. C.
Arrington, W. T. ..... 338 Main st., Memphis, Tenn.
Augspath, Louis ..... Helena, Ark.
Boyd, H. D. ..... Troy, Ala.
Brown, J. P. H. ..... Augusta, Ga.
Burr, W. H. ..... Madison, Ga.
Carpenter, L. D. ..... 47½ Whitehall st., Atlanta, Ga.
Clark, F. Y. ..... Saratoga Springs, N. Y.
Cole, W. T. ..... Newnan, Ga.
Cooke, W. H. ..... Denton, Texas.
Friedrichs, G. J. ..... 641 St. Charles st., New Orleans, La.
Gorgas, F. J. S. ..... 845 N. Eutaw st., Baltimore, Md.
Holland, Sid. G. ..... 24 Whitehall st., Atlanta, Ga.
Knapp, J. S. ..... New Orleans, La.
Lowrance, H. A. ..... Athens, Ga.
Marshall, E. B. ..... Medical Bldg., Rome, Ga.
Morgan, W. H. ..... 211 N. High st., Nashville, Tenn.
McDonald, R. A. ..... Griffin, Ga.
Rambo, Samuel ..... Montgomery, Ala.
Tigner, J. A. ..... Rome, Ga.

Any inaccuracies in name or location should be reported to the Treasurer at once in order that the necessary corrections may be made.

Annual dues being payable in advance, no name appears on the above list

except of those who have paid for 1899, and the Transactions are not sent to any who have not fully paid their dues.

Dues must be paid to the Treasurer. Send draft, P. O. order, or Express order.

HENRY W. MORGAN, *Treasurer,*
211 N. High st., Nashville, Tenn.

The Chairman of the Executive Committee offered the printed program, which, with slight changes, was accepted.

The Vice-President from the South, Dr. B. Holly Smith, then took the chair, and the President read his Annual Address, which was referred to the following committee: Drs. Jas. McManus, T. P. Hinman, and L. P. Bethel.

Certificates were read from the Dental Society of Europe delegating Drs. W. Mitchell, of London, and L. C. Bryan, of Basle, Switzerland, to represent that Society in this Association; whereupon, on motion, the privileges of the floor were extended to these gentlemen.

Committees being called, Dr. Fillebrown read the report on revision of the Constitution.

Dr. Truman moved that the report be adopted as a whole.

Dr. G. E. Hunt moved as an amendment that the report be printed for distribution among the members. The amendment was lost.

Dr. Truman's original motion was discussed by Drs. Jarvie, B. Holly Smith, and Fillebrown.

On motion of Dr. B. Holly Smith, the consideration of the report was postponed till after the report on the President's Address should be presented.

Dr. Shepard moved that the report be printed and distributed to members. Carried.

Dr. Charles McManus then read the report of the Committee on History.

On motion, the Committee was continued, and the President was authorized to fill the vacancy on the Committee, which he afterward did by the appointment of Dr. H. L. Ambler.

On motion, the following committee was appointed to examine the books of the Protective Association: Drs. C. W. Stainton, H. A. Smith, and J. Y. Crawford.

The report of the Publication Committee was then read, as follows. Referred to Auditing Committee:

The Publication Committee would respectfully offer the following report:

The Executive Committee made the usual arrangement with The S. S. White Dental Manufacturing Co. for the printing and distribution of the Transactions, and under Mr. Hise's supervision they were produced in the usual admirable manner.

Owing to causes which seemed unavoidable, they were very much delayed, and were only mailed on or about July 12.

They have been forwarded to those entitled to receive them as usual,—*i.e.*, to members who were not in arrears, to various libraries, and to honorary members, and there are on hand about one hundred copies.

Expenditures.

For stationery, copying, and postage.....$17.00

Cr.

By amount received from Treasurer..... 17.00

Respectfully,

GEO. H. CUSHING, *Chairman.*

Examined and found correct:

V. H. JACKSON,
J. D. PATTERSON,
M. F. FINLEY, *Auditing Committee.*

The Treasurer read his report, as follows. Referred to the Auditing Committee:

TREASURER'S REPORT.

NIAGARA FALLS, August 1, 1899.

To the National Dental Association, Dr.

Balance on hand August 30, 1898	$588.75	
Received during the year	1247.00	
		$1835.75

Dr.

Salary Recording Secretary	300.00
" Assistant Recording Secretary	100.00
" Treasurer	100.00
Official reporter	125.00
Printing, stationery, postage, and exchange	74.83
Executive Committee	58.50

Publication Committee	17.00	
Section II	3.70	
Section IX	2.00	
		$781.03
Balance on hand		$1054.72

Respectfully submitted,

HENRY W. MORGAN, *Treasurer.*

Examined and found correct:

J. D. PATTERSON,
V. H. JACKSON,
M. F. FINLEY, *Auditing Committee.*

Dr. Finley then read the report of the Committee on the Appointment of Dentists to the Army and Navy.

On motion of Dr. Donnally, it was referred to the Committee on the President's Address.

The following was adopted:

WHEREAS, A vote of censure was passed by the National Dental Association at its annual meeting in Omaha, in 1898, upon the New Jersey State Dental Society, for indorsing a secret and proprietary medicine; and

WHEREAS, The New Jersey State Dental Society has disclaimed any intention of giving indorsement to any secret or proprietary medicine, and has made every effort through the courts to rectify the matter; therefore

Resolved, That the vote of censure upon the New Jersey Society be rescinded.

(Signed) J. D. PATTERSON,
M. F. FINLEY,
of Committee on Credentials.

An invitation was read from the Niagara Falls Power Company to visit their plant. Action was deferred till a later time.

Adjourned till 7.30 P.M.

FIRST DAY—EVENING MEETING.

The Association was called to order at 8 P.M.; the President in the chair.

The minutes of the morning meeting were read and approved.

The Corresponding Secretary read her report, as follows, which was referred to the Auditing Committee:

REPORT OF CORRESPONDING SECRETARY.

NIAGARA FALLS, N. Y., August 1, 1899.

During the past year the Corresponding Secretary has answered all letters of inquiry addressed to her; has sent a notice to each State Dental Association at or near the time of its annual meeting, calling attention to the By-Laws of the National Association in regard to representation; also, had preliminary program and notice of this meeting printed and mailed to each member of this Association and of the Southern Branch, and sent blank certificates for delegates to each Society requesting them.

The bills paid have been as follows:

Printing	$14.00
Postage	7.00
	$21.00

Respectfully submitted,

EMMA EAMES CHASE,
Cor. Sec'y National Dental Ass'n.

Examined and found correct:

J. D. PATTERSON,
V. H. JACKSON,
M. F. FINLEY, *Auditing Committee.*

On motion, the courtesies of the floor were extended to Dr. John E. Grevers, of Amsterdam.

An invitation was here presented from the Virginia State Dental Society, asking the Association to meet in Virginia next year.

A communication was presented from Dr. Huxmann, of Chicago, which was declared out of order.

Section II being called, Dr. Guilford read the report, and offered the following papers to be read: "Manual and Artistic Training in our Preliminary Education," by R. H. Hofheinz; "Dental History, a Part of the College Curriculum," by B. J. Cigrand; "Roentgen Rays," by C. Edmund Kells; "Dental Articulation and Occlusion," by Wm. Ernest Walker; "The Legal Status of the Graduate Dentist," by J. A. Chapple, which presented a Supreme Court decision in North Carolina.

Dr. Hofheinz read his paper on "Manual and Artistic Training in our Preliminary Education." Discussed by Drs. Truman, Black, Sitherwood, Brophy, C. N. Johnson, Newkirk, B. Holly Smith, and closed by Dr. Hofheinz.

Dr. Cigrand then read his paper, entitled "Dental History, a Part of the College Curriculum." Discussed by Drs. Chas. McManus and Stainton.

At this point the following was adopted: "That after this no papers shall be presented before the general body that have not been read in the Sections."

The discussion was continued by Drs. Ambler, Barrett, and Black, and closed by Dr. Cigrand.

Dr. W. E. Walker then read his paper, entitled "Dental Articulation and Occlusion."

Dr. Barrett asked unanimous consent to take up at 11 o'clock tomorrow morning Dr. Brophy's subject. It was so ordered.

Dr. Chapple then read his paper, "The Legal Status of the Graduate Dentist."

The Committee on Credentials made a partial report, which was subsequently completed, as follows:

Colorado State Dental Association—W. E. Griswold.

Connecticut State Dental Association—Edward Eberle.

District of Columbia Dental Society—F. W. Parker, W. W. Evans, M. F. Finley, A. J. Brown.

Florida State Dental Society—A. E. Lyman.

Georgia State Dental Society—B. H. Williams.

Illinois State Dental Society—Thomas L. Gilmer, W. V-B. Ames, F. H. Gardiner, W. H. G. Logan, Garrett Newkirk, G. V. Black, Robert Good, B. J. Cigrand.

Indiana State Dental Association—W. W. Shryock, Maurice Albrecht, Melville A. Mason.

Kansas State Dental Association—Charles L. Hungerford.

Maryland State Dental Association—A. P. Gore, M. W. Foster.

Massachusetts State Dental Society—W. E. Boardman, Geo. E. Savage, Herbert L. Wheeler, Almona F. Townsend, Geo. A. Lowe, Mary E. Gallup, Andrew J. Flanagan.

Michigan State Dental Association—W. H. Jackson.

Minnesota State Dental Association—Miland A. Knapp, W. P. Dickinson.

Missouri State Dental Association—J. H. Kennerly, Otto J. Fruth, E. H. Angle, A. J. McDonald.

Dental Society of the State of New York—F. B. Keppy, Wm. Carr, H. C. Ferris, J. H. Collins, W. A. White, W. W. Smith, C. H. Barnes, F. W. Low, R. H. Hofheinz, A. M. Wright, John A. Schmidt, H. B. Huver.

North Carolina State Dental Society—E. J. Tucker.

Ohio State Dental Society—W. C. Graham, O. N. Heise.

Ontario Dental Society—John E. Wilkinson, W. E. Willmott, J. Frank Adams, G. S. Martin, A. E. Webster.

Pennsylvania State Dental Society—H. Newton Young, M. H. Cryer, J. A. Libbey.

South Carolina State Dental Association—J. Edwin Boozer, D. L. Boozer, Jr.

Wisconsin State Dental Society—B. G. Maercklein, C. L. Babcock.

The Association then adjourned till 9 A.M. to-morrow.

SECOND DAY—MORNING MEETING.

The Association was called to order at 9.30 A.M.; the President in the chair.

Reading of the minutes was dispensed with.

Under miscellaneous business, the Assistant Secretary read his report, which was referred to the Auditing Committee:

REPORT OF ASSISTANT RECORDING SECRETARY.

As your Assistant Recording Secretary, duly appointed at Old Point Comfort, and reappointed at Omaha, I beg to report that I have performed the duties assigned me to the best of my ability. In the absence of our honored Secretary I kept a faithful record of the proceedings at the Omaha meeting, and, as soon as practicable, a copy of the same was sent to the Recording Secretary for approval. The same will be found incorporated in the printed volume of Transactions. Having been instructed by the Chairman of the Executive Committee "to assume all the duties of the Secretary's office," I issued postal cards to all the members of the Association, for the purpose of organizing the Sections; a second, and in some cases a third, card was sent to those who were slow in responding. The Sections were organized in accordance with the replies received, those who made no reply being retained in Section to which they were assigned at Old Point Comfort, or in the case of new members having no previous assignment, distributed to equalize the Sections numerically. A copy of the organization of each Section was sent to the several Chairmen and Secretaries of Sections early in December. By order of

the Chairman of the Executive Committee the stenographer's report and all other documents in my hands were transferred to the Secretary, Dr. Geo. H. Cushing, about the middle of October.

A number of communications, addressed to me in error, have been referred to your Corresponding Secretary. Having received many requests for copies of the Constitution, I obtained a small supply, which I have distributed as called for.

I also succeeded in obtaining the reinstatement of a large number of members who were not present at Old Point Comfort, but who subsequently paid their dues in time to be enrolled as "permanent members."

My expenses during the two years, for printing, expressage, and postage, stationery and sundries, as per statement attached, amount to $24.86.

Respectfully submitted,

WM. ERNEST WALKER,
Assistant Recording Secretary N. D. A.

PASS CHRISTIAN, MISS., August 1, 1899.

Examined and ordered paid:

V. H. JACKSON,
J. D. PATTERSON,
M. F. FINLEY, *Auditing Committee.*

Section III was called, and the Chairman, Dr. J. Y. Crawford, made a partial verbal report, introducing Dr. N. S. Jenkins, of Dresden, Germany, who read a paper on "Porcelain Enamel Inlays," which was discussed by Drs. J. I. Hart, E. T. Darby, C. N. Johnson, Head, George Evans, McKellops, and Ottolengui, and closed by Dr. Jenkins.

The hour for the special order having arrived, Dr. Brophy read his paper, entitled "The Radical Cure of Congenital Cleft Palate." He afterward exhibited two patients on whom he had operated. Discussed by Drs. Barrett and Cryer.

Section III being resumed, Dr. Crouse read a paper, entitled "A Résume of the Important Changes that have Taken Place in Dentistry during the Last Thirty-five Years." Discussed by Drs. S. B. Palmer, Black, Crawford, Kells, McKellops, Noble, Barrett, and closed by Dr. Crouse; after which Dr. Black again spoke; answered by Dr. Crouse.

Adjourned to 7.30 P.M.

SECOND DAY—EVENING MEETING.

The Association was called to order at 7.45 P.M.; the President, Dr. Burkhart, in the chair.

Reading the minutes was dispensed with.

Under miscellaneous business, Dr. Guilford in the chair, the report of the Committee on the President's Address was read by Dr. Jas. McManus. On motion, the report was adopted.

The Committee on Credentials made a further partial report.

The records were ordered corrected regarding Dr. Shryock's resignation, which he says appears by mistake, as he did not resign, and wishes to be considered as a continuous member.

A communication from the Dental Society of the State of New York was read by the Assistant Secretary, and Dr. Ottolengui gave notice that he should offer a resolution on the subject to-morrow morning.

Lantern exhibits were then offered by Drs. Kells, Fillebrown, Cryer, and Grevers. Discussion was postponed till to-morrow.

Association adjourned till 9 A.M. to-morrow.

THIRD DAY—MORNING MEETING.

The Association was called to order at 9 A.M.; the President, Dr. Burkhart, in the chair.

Reading the minutes was dispensed with.

Under miscellaneous business, the report of the Committee on the Code of Ethics was read by Dr. H. A. Smith.

On motion of Dr. Crawford to adopt, Dr. Patterson offered an amendment to strike out a certain clause. The amendment was adopted, and the report as amended was adopted.

[The Code, as adopted, will be found at the end of the volume.]

Dr. Crawford offered the following resolution, which, after discussion by Drs. Jarvie and Truman, was adopted:

WHEREAS, The National Dental Association deems it a duty to express its condemnation of the continued forcing of politics into the formation of State Examining Boards; be it

Resolved, That while such bodies are of service to the public when composed of thoroughly competent men, they are a decided menace and disgrace to dentistry when self-seeking and unprofessional individuals are placed upon such boards solely through political influence.

The Secretary read an invitation from the Carborundum Company to visit their works.

The report of the committee to examine the books of the Dental Protective Association was read and adopted, as follows:

Your Committee to examine the accounts of the Dental Protective Association report that they have examined the books of the Protective Association and the vouchers for the last six months. Those of the previous six months, which had been examined by a Committee of the Association at its annual meeting last December, and filed away, were overlooked by Dr. Crouse, and of course were not examined by us.

We find the books and vouchers correct, and believe the affairs of the Association honestly conducted. All bills are paid, and the balance is in hand. The history of this Association for the past year or two is a meager one,—far too meager for the credit of the dentists of the United States. With a membership of thirty-eight hundred, after such results as this organization has given us, the most determined efforts of Dr. Crouse and his supporters have prevailed upon only about eight hundred of the thirty-eight hundred to keep their solemn legal contract and pay their assessment.

Such a condition is a shame and disgrace. If we will remember "the hole of the pit whence we were digged" and come loyally to the support of an organization which has done more for us than most of us appreciate, the protection and glorious history of past years will be with the Dental Protective Association in the future.

(Signed) C. W. STAINTON,
J. Y. CRAWFORD,
H. A. SMITH, *Committee.*

Dr. Walker asked if Dr. Crouse could explain the paragraph in yesterday's *New York Herald,* about the millions to be taken from the pockets of dentists.

Dr. Crouse replied that a meeting of the Dental Protective Association would be held to-morrow morning, at which the matter would be discussed.

Dr. Wedelstaedt then read a paper, entitled "Cements," the discussion of which was opened by Dr. C. N. Johnson; after which Dr. Ames, of Chicago, read a paper, entitled "Some Phases of the Cement Question."

The two papers were discussed by Drs. Black, Patterson, and Crouse. The discussion was closed by Drs. Wedelstaedt and Ames.

Dr. Black then read a paper, entitled "Susceptibility and Immunity to Dental Caries," and Dr. C. N. Johnson read his paper on "The Management of Children's Teeth." His reading was immediately followed by a paper by Dr. James Truman, on "Reflexes from Lower Molars."

The discussion of the above papers was made the special order for 3 P.M. to-day.

Association then adjourned to 2 P.M.

THIRD DAY—AFTERNOON MEETING.

The President, Dr. Burkhart, called the Association to order at 2.15 P.M.

Reading of minutes was dispensed with.

Dr. Ottolengui read his paper on "Prognathism," after which, the discussion on the papers of Drs. Black and Johnson being in order, it was opened by Dr. Bryan, of Basle, Switzerland; he was followed by Drs. S. B. Palmer, Corydon Palmer, H. H. Jackson, Leonard, Hofheinz, and Black. The discussion was then deferred till 7 P.M., and Dr. Custer read his paper on "Dental Electricity."

On motion of Dr. Donnally, the editors of the dental journals of the United States were added to the Committee on "Army Dental Surgeon Legislation."

The Association then adjourned to 7.30 P.M., to permit the members the opportunity to visit the plants of the Power Company and the Carborundum Company. A large number availed themselves of the opportunity.

THIRD DAY—EVENING MEETING.

The Association was called to order at 8 P.M.; the President, Dr. Burkhart, in the chair.

The reading of the minutes was dispensed with.

Under miscellaneous business, the following, offered by Dr. Ottolengui, was adopted:

Resolved, That prior to final adjournment, the Committee on International Congress be instructed to report as to its work to date.

The Committee on Revision of the Constitution reported as follows. With some slight amendments, the report was unanimously adopted:

Voted, that the following changes in the Constitution, Rules of Order, and Order of Business shall be made:

Section 3 of Article III shall be changed so as to read: All delegate members shall be practitioners of dentistry. They shall be received only from permanently organized dental societies, and shall be members who have done some meritorious work for the profession; but no person shall be received as a delegate who is in arrears for dues to this Association.

Section 1, Article IV, shall be changed so as to read: Any permanently organized dental society may send one for every six of its active members as delegates to this Association for one year, upon complying with the requirements of its Constitution; but no society shall be entitled to representation that does not adopt or substantially recognize the Code of Ethics of this Association.

These were objected to, and consequently lie over for action in 1900.

The following by unanimous consent were adopted:

From Section 2, Article V, the words "for membership" shall be stricken out.

In Section 5, Article V, after the word "report" in the fifth line, the words "to the Executive Council" shall be inserted; and after the word "vote" in the sixth line, the words "of the Council" shall be inserted.

In Section 7, Article V, after the word "which" in the second line the words "by the Council" shall be inserted, and for the word "Association" in the sixth line, the words "of the Council" shall be inserted.

In Article VI, Section 2 shall be numbered 3; Section 3 shall be numbered 4; Section 4 shall be numbered 6; Section 5 shall be numbered 7.

Section 2, Article VI, shall be inserted to read as follows:

EXECUTIVE COUNCIL.

The President, Secretary, and five members to be elected annually by the Association shall constitute an Executive Council, and shall be governed by the same rules of order as the Association.

Section 3, Article VI, shall read between the words "Treasurer" and "shall," "members of the Executive Council and Executive Committee."

The last two lines of Section 3, Article VI, shall constitute Section 5 of Article VI.

In Section 4, Article VI, the words, "and shall rank by seniority" shall be stricken out.

In Section 3, Article VII, after the last word "desirable" shall be added, "and shall report to the Executive Council."

In Section 4, Article VII, the word "meetings" in the last line shall be stricken out and the word "sessions" substituted.

In Section 5, Article VII, the word "meeting" in the fifth line shall be stricken out, and the word "session" be substituted; and in the last line "Executive Council" shall be substituted for "Association."

In Section 6, Article VII, the last word "present" shall be stricken out, and the words "of the Association present at a regular meeting," added.

The following sections numbered 7, 8, 9, 10, 11, and 12, defining the duties of the Executive Council, shall be inserted in the Constitution in Article VIII.

Section 7. The Executive Council shall meet at ten o'clock on the day of the first meeting of each annual session, and afterward by adjournment or at the call of the presiding officers for the reception of the reports of officers and committees, and for the transaction of other business of the Association.

Section 8. All matters not otherwise specially provided for shall be referred to the Executive Council without debate.

Section 9. The Executive Council shall report to the Association at each session the results of their proceedings for ratification or rejection without debate.

Section 10. The President and Secretary of the Association shall hold the same position in the Executive Council as in the Association.

Section 11. Four members of the Council shall constitute a quorum for the transaction of business.

Section 12. All meetings of the Council shall be public, the time and the place for which shall be posted for information of the members. Members may be heard on any matter before the Council.

From Section 1, Article VIII, the words "shall consist of nine members," and the words "to whom shall be referred all business not otherwise specially provided for" shall be stricken out.

After the word "report" shall be inserted "to the Executive Council." The word "meeting" shall be omitted from the last line, and the word "session" substituted.

From Section 2, Article VIII, the word "three" in the fourth line shall be stricken out and the word "one" substituted. The word "one" in the fifth line shall be omitted.

After the word "by" in the fourth line the word "separate" shall be inserted.

In Section 3, Article VIII, the word "three" shall be inserted after the word "into" in the third line, and from the same line the words "of three such" shall be stricken out.

In Section 4, Article VIII, the words "these three" in the fourth line shall be stricken out and the word "they" inserted. In the seventh line the word "and" shall be stricken out.

In Section 6, Article VIII, the word "and" in the second line, and all the words in the second, third, and fourth lines after the word "Association" shall be stricken out, and the words "and such as they approve they shall refer to the proper Section" shall be inserted.

The word "meeting" in the last clause shall be omitted, and the word "session" be substituted.

In Section 7, Article VIII, the word "Association" shall be omitted, and the words "Executive Council" substituted.

The last four words, "as early as practicable," shall be omitted.

In Section 8, Article VIII, the word "meeting" in the last line shall be omitted, and the word "session" be added.

In Section 3, Article IX, the word "Association" in the third line shall be omitted, and the words "Executive Council" be substituted.

From Article X the words "for the transaction of business" shall be stricken out.

Section 1, Article XII, shall be changed so as to read: "The regular sessions of this Association shall commence annually at 11 A.M. on the first Tuesday after the last Saturday in August, or at such time as shall be determined by vote of the Association at the annual session."

Section 2, Article XII, shall be changed so as to read: "The place for holding the next annual session shall be determined each year by ballot of the Association at its annual session, except that the place shall be in the West in 1898, in the East in 1899, and in the South in 1900, and thereafter in the order named; meeting in each section every third year."

Article XIII shall read:

ARTICLE XIII.

ORGANIZATION OF SECTIONS.

Section 1. This Association shall be divided into six Sections, as follows:

1. Prosthetic Dentistry, including Crown- and Bridge-Work, Metallurgy, Chemistry, Orthodontia.
2. Dental Education, Literature, Nomenclature, Histology and Microscopy.
3. Operative Dentistry, Materia Medica and Therapeutics.
4. Physiology, Etiology, Hygiene, Prophylaxis, and Electricity.
5. Anatomy, Pathology, and Surgery.
6. Clinics.

All of Section 2, Article XIII, after the word "Association" in the fourth line shall be omitted.

To Section 3, Article XIII, shall be added, "before the close of the morning meeting of the second day of the session."

In Section 4, Article XIII, "meeting" shall be substituted for "session."

Section 5, Article XIII, shall be changed to read: "The members of each Section shall choose a Chairman and Secretary, and they shall be members known to be capable and interested in the performance of the duties of the offices."

In Section 6, Article XIII, in the sixth line the word "session" shall be substituted for "meeting."

Section 7, Article XIII, shall read 9.30 A.M., instead of 10 A.M., and "session" instead of "meeting."

Section 2, Article XIV, shall read "session" instead of "meeting."

Section 8, Article XIV, shall in the first line read "session" instead of "meeting."

The Order of Business shall be changed so as to read as follows:

8 A.M.—Meeting of Executive Committee for filling of vacancies.
9 A.M.—Meeting of Executive Council.
10 A.M.—Meeting of Sections.
11 A.M.—Meeting of the Association.
President's address.
Report of Sections and discussions.
Report of Executive Council.
Ballot for place of next annual sessions.
Election of officers.
Installation of officers.
Appointment of committees.
Reading of minutes.
Adjournment.

On motion of Dr. Crouse, the following committee was appointed to organize the Section work for next year: J. N. Crouse, G. V. Black, G. V. I. Brown.

The Sections were organized as follows:

SECTION I. Prosthetic Dentistry, Crown- and Bridge-Work, Metallurgy, Chemistry, and Orthodontia.—V. H. Jackson, chairman; W. E. Walker, secretary. Chas. L. Babcock, G. H. Wilson, W. E. Grant, H. T. Smith, W. W. Shryock, W. H. Fundenberg, R. H. Nones, L. C. Taylor, W. Storer How, J. A. Hall, C. V. Vignes, W. E. Griswold, B. J. Cigrand, Chas. Mermilloid, Eugene H. Smith, Mary E. Gallup, Miland A. Knapp, J. H. Kennedy, R. Ottolengui, E. H. Angle, H. B. Noble, C. L. Alexander, C. A. Bland, E. F. Comegys, T. E. Craddock, A. P. Gore, Chas. S. Grindall, O. J. Gross, F. H. McAnnally, W. Scott Smith, H. B. Tileston, W. E. Wilmott, Emma E. Chase, Louis C. LeRoy, G. D. Sitherwood, W. V-B. Ames, Gordon White, G. M. Whitfield, M. B. Straight, H. McManus, S. A. Freeman, Jos. Head, J. Rollo Knapp, E. J. Tucker, H. S. Seip, H. C. McBrair, M. C. Smith, G. E. Savage, J. W. Combs, V. S. Jones, W. W. Evans, S. C. G. Watkins, H. H. Jackson.

SECTION II. Dental Education, Literature, Nomenclature, Histology and Microscopy.—S. H. Guilford, chairman; M. F. Finley, secretary. I. P. Wilson, Theo. Menges, J. A. Libbey, G. H. Wilson, A. J. Brown, Waldo E. Boardman, Jacob L. Williams, W. H. Whitslar, C. S. Butler, M. F. Ault, W. E. Walker, J. H. Benton, Edward C. Kirk, Howard E. Roberts, Chas. McManus, Henry W. Morgan, Henry Barnes, C. H. Barnes, H. C. Thompson, A. F. Townsend, J. D. Wise, Wallace Wood, Jr., W. St. George Elliott, Louis C. LeRoy, A. J. Flanagan, Otto J. Fruth, L. A. Faught, C. C. Chittenden, F. LeGrand Ames, D. L. Boozer, T. W. Brophy, J. Y. Crawford, J. N. Crouse, M. H. Cryer, Geo. E. Hardy, J. H. Harris, A. P. Johnstone, C. R. Jefferis, G. A. Lowe, A. E. Lyman, R. Maercklein, J. P. McDonald, L. D. Shepard.

SECTION III. Operative Dentistry, Materia Medica and Therapeutics.—Thos. E. Weeks, chairman; J. I. Hart, secretary. A. H. Peck, Maurice Albrecht, H. L. Ambler, W. T. McLean, A. H. Fuller, C. W. Stainton, B. Q. Stevens, W. P. Dickinson, J. E. Wilkinson, A. R. Melendy, A. J. Brown, Thos. Fillebrown, Henry C. Jones, E. S. Gaylord, L. C. Taylor, G. W. Hoysradt, Milton F. Ault, J. J. Sarrazin, H. C. Ferris, S. W. Johnson, W. F. Litch, D. D. Smith, Henry Barnes, R. K. Luckie, B. D. Brabson, E. N. Kibler, F. H. Gardiner, C. K. Van Vleck, H. S. Seip, Victor S. Jones, Otto J. Fruth, L. G. Noel, F. B. Keppy, S. C. G. Watkins, J. E. Boozer, T. C. West, H. H. Johnson, T. M. Allen, W. E. Burkhart, A. E. Webster, G. E. Hunt, J. Frank Adams, E. A. Bogue, S. Freeman, Wm. Conrad, W. G. Mason, L. P. Leonard, A. R. Starr, R. H. Hofheinz, W. C. Graham, N. S. Hoff, C. N. Johnson, M. A. Mason, M. B. Straight, Jas. McManus, A. W. Harlan, W. A. Price, F. L. Wood, I. Simpson, Earl P. Hawes, Louis C. LeRoy, William Jarvie, T. T. Moore.

SECTION IV. Physiology, Etiology, Hygiene, Prophylaxis, and Electricity.—J. D. Patterson, chairman; L. E. Custer, secretary. W. Storer How, H. A. Smith, W. E. Walker, A. M. Wright, L. P. Leonard, W. W. Smith, J. P. Corley, D. D. Smith, H. J. Allen, Geo. S. Vann, L. A. Faught, L. D. Archinard, Jos. Bauer, H. E. Beach, W. H. Buckley, H. J. Burkhart, J. W. Canady, M. B. Culver, James Truman, V. E. Turner, J. N. Van De Water, J. L. Walker, W. R. Wright, H. Newton Young, Garrett Newkirk, A. L. Northrop, E. T. Darby, S. B. Dewey, Wms. Donnally, R. J. Hart, O. N. Heise, G. E. Johnson, S. W. Johnson, C. E. Kells, Jr., R. N. Kesterson, A. B. King, G. S. Martin, B. G. Maercklein, H. B. McFadden, Louis Ottofy, F. W. Parker, J. D. Patterson, A. H. Sibley, Chas. Sill.

SECTION V. Anatomy, Pathology, and Surgery.—W. C. Barrett, chairman; M. L. Rhein, secretary. W. T. McLean, W. H. G. Logan, Chas. P. Pruyn, L. M. Cowardin, H. T. King, Herbert L. Wheeler, C. A. Brackett, G. V. I. Brown, E. M. Kettig, Wm. Carr, M. C. Smith, T. L. Gilmer, H. C. Miller, Jno. R. Beach, J. S. Cassidy, W. G. Chase, G. B. Clements, L. P. Dotterer, S. G. Duff, W. W. Walker, J. W. Wassall, T. S. Waters, W. J. Younger, T. T. Moore, Edw. Eberle, D. E. Everitt, Geo. L. Field, J. G. Fife, Thos. P. Hinman, C. W. F. Holbrook, Frank Holland, J. Thos. Lippincott, F. W. Low, W. T. Martin, F. J. Maynard, Grant Molyneaux, D. N. McQuillen, S.

H. McKee, J. D. Pfeiffer, B. Holly Smith, J. W. Storer, H. S. Sutphen, R. W. Talbott.

SECTION VI. Clinics.—H. J. McKellops, chairman; M. B. Culver, secretary. Thos. Fillebrown, S. Freeman, Wm. Conrad, L. P. Leonard, I. Simpson, M. S. Merchant, A. J. McDonald, T. M. Allen, E. P. Beadles, L. P. Bethel, G. V. Black, W. R. Clifton, D. W. Clancy, S. J. Cockerille, W. N. Cogan, J. H. Collins, W. B. Finney, M. W. Foster, A. J. Foret, T. P. Whitby, T. E. Weeks, F. C. Wilson, B. H. Williams, J. E. Frazier, S. H. Guilford, Robert Good, C. L. Hungerford, A. O. Hunt, W. T. Jackman, W. H. Jackson, H. R. Jewett, H. W. Morgan, G. S. Nason, J. J. Nelson, R. A. Rush, B. Rutledge, R. D. Seals, J. A. Schmidt, L. A. Smith, J. G. Templeton.

On motion of Dr. Harlan, the following was adopted:

To the National Dental Association:

The Committee on International Dental Congress request that the next annual meeting be held on July 10 or July 17, 1900, in order that the members may be given time to attend the Dental Congress which will open on August 8, 1900, in Paris.

Respectfully,

A. W. HARLAN, *Chairman.*
W. E. GRISWOLD, *Secretary.*

The papers of Dr. Black and Dr. Johnson were further discussed by Drs. Crawford, B. Holly Smith, Newkirk, Darby, Bogue, McKellops, Harlan, Hofheinz, Sitherwood, Vann, Ames, and Conrad, and closed by Dr. Black.

Fifteen minutes was allowed for discussion of Dr. Ottolengui's paper. Discussed by Dr. Guilford; closed by Dr. Ottolengui.

The Association then adjourned to 9.30 A.M. to-morrow.

FOURTH DAY—MORNING MEETING.

The Association was called to order at 9.30 A.M.; the President in the chair.

The reading of the minutes was dispensed with.

The resignation of Dr. J. B. Monfort, of Fairfield, Iowa, was read, and, on motion, was accepted.

Section IV was called, and Dr. Head read his paper, entitled "Physiological Reasons for Supposing that Dentin and Enamel in Pulpless Teeth may be Nourished."

A paper by Dr. Harvey, entitled "Constitutional Deterioration a Cause of Dental Caries, or the Dental Problem of the Twentieth Century," was read by title and referred to the Publication Committee.

Dr. Bryan addressed the Association, asking the appointment of a Committee on International Relations as to Diplomas. This was voted, and the Chair appointed Drs. Crouse, Gordon White, and Ottolengui.

Section V, Materia Medica and Therapeutics, was called, and Dr. Cassidy, the Chairman, read his report, offering papers, by Drs. D. D. Smith, entitled "The True Status of the Pulpless Tooth;" by Dr. A. W. Harlan, entitled "Recent Advances in Therapeutics," and by Dr. W. E. Griswold, entitled "Counter-Irritation."

Dr. D. D. Smith read his paper, entitled "The True Status of the Pulpless Tooth."

Dr. Hungerford read his paper on "The Physiological Relation of the Dental Pulp to the Economy."

These were discussed by Drs. Rhein and Black; closed by Drs. D. D. Smith and Hungerford.

Dr. Harlan offered his own and Dr. Griswold's papers to be read by title.

The report of Section IX, Orthodontia, took the same course.

Dr. G. V. I. Brown offered models for examination, with remarks explanatory of the same.

The report of Section I, Prosthetic Dentistry, Chemistry, and Metallurgy, with accompanying papers, was read and referred to the Publication Committee.

The Auditing Committee reported that they had examined the reports of the Publication Committee, the Treasurer, the Corresponding Secretary, and the Assistant Recording Secretary, and found them correct.

The time for selection of place of next meeting and election of officers having arrived, that business was proceeded with.

Old Point Comfort, Va., was chosen as the place of next meeting.

On motion, the Executive Committee was authorized to change the place of meeting in case of necessity.

The report of Section VII, Anatomy, Pathology, and Surgery, with accompanying papers, was offered and referred to the Publication Committee.

Motion to meet June 26 carried.

The election of officers resulted as follows:

President—B. Holly Smith, of Baltimore.

Vice-President for the East—John I. Hart, of New York.

Vice-President for the West—T. W. Brophy, of Chicago.

Vice-President for the South—M. F. Finley, of Washington, D. C.

Corresponding Secretary—Mrs. Emma Eames Chase, of St. Louis.

Recording Secretary—Geo. H. Cushing, of Burbank, Cal.

Assistant Recording Secretary—A. H. Peck, of Chicago, Ill.

Treasurer—Henry W. Morgan, of Nashville, Tenn.

On Executive Committee—H. A. Smith, T. S. Waters, and J. D. Patterson.

The Executive Council provided for under the amended Constitution were elected as follows: H. J. Burkhart, Thos. Fillebrown, J. Y. Crawford, J. S. Cassidy, and W. E. Griswold.

On motion, the report of the Committee on National Dental Museum and Library was ordered printed in the Transactions without being read to the Association.

Committee on Necrology made their report, which will be found on the memorial page.

The Association then adjourned till 3.30 P.M.

FOURTH DAY—AFTERNOON MEETING.

The Association was called to order at 3.30 P.M.; Dr. Burkhart, the President, in the chair.

The minutes from the second day, the reading of which had been postponed, were then read and approved.

Report of Section III was presented.

On motion, it was ordered that the rules adopted by the Section be printed with the report.

The following was presented for adoption, and was referred to the committee having charge of Section work:

Voted that Section 7, of Article XIII, shall be changed so as to read as follows:

The Chairmen and Secretaries of the several Sections shall meet in joint session with the third division of the Executive Committee at 8.30 A.M. on the morning of the first day of the annual sessions of the Association.

All papers must be in the hands of the Secretary of the respective Sections at least fifteen days prior to the first day of the annual sessions.

This Joint Committee shall select the best and most suitable essays presented for consideration by the general meetings; and refer the remaining papers for consideration to the proper Sections.

On motion, the standing rule requiring the presentation of two general essays at each annual session was rescinded.

A vote of thanks was tendered the railroads and such hotels as had made concessions to the members of the Association; also to the Niagara Falls Power Company and the Carborundum Company for the courteous invitations to visit their works.

The President here appointed Drs. Maynard and Stainton to conduct the newly-elected President to the chair.

On motion of Dr. Crouse, a special vote of thanks was tendered to Dr. H. J. Burkhart for the admirable manner in which he had presided over the Association.

On motion, it was ordered that papers that were not acted upon at this session be left over for consideration next year.

Drs. Jas. McManus and H. B. Noble were appointed to fill vacancies on Necrology Committee.

Dr. H. L. Ambler was appointed to fill vacancy in Committee on History.

The following were appointed a Committee on Legislation Favoring a Corps of Dental Surgeons in the Army and Navy:

COMMITTEE ON LEGISLATION FAVORING A CORPS OF DENTAL SURGEONS FOR THE ARMY AND NAVY.

1. Alabama.....Dr. T. P. Whitby, Selma.
2. Arizona.....Dr. W. G. Lentz, Phœnix.
3. Arkansas.....Dr. J. F. Stillwell, Searcy.
4. California.....Dr. C. L. Goddard, San Francisco.
5. Colorado.....Dr. W. E. Griswold, Denver.
6. Connecticut.....Dr. E. S. Gaylord, New Haven.
7. Delaware.....Dr. R. H. Jones, Wilmington.
8. Florida.....Dr. S. W. Allen, Tampa.
9. Georgia.....Dr. J. A. Chapple, Atlanta.
10. Idaho.....Dr. H. S. Bettis, Boise City.
11. Illinois.....Dr. T. W. Brophy, Chicago.
12. Indiana.....Dr. R. T. Oliver, Indianapolis.
13. Iowa.....Dr. W. S. Hosford, Iowa City.
14. Indian Territory.....Dr. Chas. W. Day, Vinita.
15. Kansas.....Dr. F. B. Lawrence, El Dorado.
16. Kentucky.....Dr. H. B. Tileston, Louisville.
17. Louisiana.....Dr. J. J. Sarrazin, New Orleans.
18. Maine.....Dr. E. J. Roberts, Augusta.
19. Maryland.....Dr. T. S. Waters, Baltimore.
20. Massachusetts.....Dr. J. F. Dowsley, Boston.
21. Michigan.....Dr. L. C. Moore, Detroit.
22. Minnesota.....Dr. Laurence Leonard, Waseca.
23. Missouri.....Dr. S. C. A. Ruby, Clinton.
24. Mississippi.....Dr. Wm. E. Walker, Pass Christian.
25. Montana.....Dr. Frank B. Norris, Helena.
26. Nebraska.....Dr. A. W. Nason, Omaha.
27. New Hampshire.....Dr. Geo. A. Young, Concord.
28. New Jersey.....Dr. C. W. F. Holbrook, Newark.
29. New Mexico.....Dr. D. W. Manley, Santa Fé.
30. New York.....Dr. Wm. Carr, New York city.
31. North Carolina.....Dr. V. E. Turner, Raleigh.
32. Nevada.....Dr. J. W. Funstone, Virginia City.
33. North Dakota.....Dr. S. P. Johnson, Grand Forks.
34. Ohio.....Dr. Otto Arnold, Columbus.
35. Oklahoma Territory.....Dr. E. E. Kirkpatrick, Oklahoma.
36. Pennsylvania.....Dr. J. A. Libbey, Pittsburg.
37. South Carolina.....Dr. T. T. Moore, Columbia.
38. Rhode Island.....Dr. C. A. Brackett, Newport.
39. South Dakota.....Dr. C. L. Blunt, Yankton.
40. Tennessee.....Dr. Gordon White, Nashville.
41. Texas.....Dr. W. R. Clifton, Waco.
42. Utah.....Dr. Geo. E. Ellerbeck, Salt Lake City.
43. Vermont.....Dr. S. Dwight Hodge, Burlington.
44. Virginia.....Dr. T. H. Parramore, Hampton.
45. West Virginia.....Dr. H. H. Harrison, Wheeling.
46. Wisconsin.....Dr. G. V. I. Brown, Milwaukee.
47. Wyoming.....Dr. Wm. T. Buchanan, Cheyenne.

EDITORS.

(1) Dr. Edward C. Kirk, Philadelphia, Pa.
(2) Dr. J. N. Crouse, Chicago, Ill.
(3) Dr. James Truman, Philadelphia, Pa.
(4) Dr. R. Ottolengui, New York, N. Y.
(5) Dr. L. P. Bethel, Kent, Ohio.
(6) Dr. A. W. Harlan, Chicago, Ill.
(7) Dr. J. D. Patterson, Kansas City, Mo.
(8) Dr. Frank L. Platt, San Francisco, Cal.
(9) Dr. J. A. Dale, Nashville, Tenn.
(10) Dr. B. H. Catching, Atlanta, Ga.
(11) Dr. Richard Grady, Baltimore, Md.
(12) Dr. A. W. Haidle, Marquette, Michigan.
(13) Dr. J. Taft, Cincinnati, Ohio.

The following notice of amendment to the Constitution was presented. It lies over until next year:

ARTICLE VI.

OFFICERS.

Page 4.

SECTION 2.

I move to strike out what follows, viz:

EXECUTIVE COUNCIL.

The President, Secretary and five members to be elected annually by the Association shall constitute an Executive Council, and shall be governed by the same rules of order as the Association.

and to adopt

ARTICLE IV.

DELEGATES FROM STATE SOCIETIES.

Page 2.

SECTION 1. *Any permanently organized dental* society may send one for every six of its active members, as delegates to this Association for one year, upon complying with the requirements of its Constitution; but no society shall be entitled to representation that does not adopt or substantially recognize the Code of Ethics of this Association.

E. A. BOGUE.

The President appointed Drs. A. W. Harlan and C. N. Johnson on the Publication Committee.

The minutes were then read and approved, and the Association adjourned to meet at Old Point Comfort, Va., on Tuesday, June 26, 1900.

GEO. H. CUSHING,
Recording Secretary.

HONORARY MEMBERS.

Watt, George,* (A.D.A.) ..... Xenia, Ohio.
Petermann, Adolph,* (A.D.A.) ... Frankfort-on-the-Main, Germany.
Langsdorf, Georg von, (A.D.A.) .. Friedburg, Baden.
Turner, J. Smith, M.R.C.S., (A.D.A.) ..... London, England.
Tomes, Chas. S., M.A., M.R.C.S., (A.D.A.) ..... London, England.
Tomes, Sir John,* F.R.S., M.R.C.S., (A.D.A.) ..... London, England.
Magitot, E.,* M.D., (A.D.A.) ..... Paris, France.
Stevens, Mordaunt, M.D., D.D.S., M.R.C.S., (A.D.A.) ..... Paris, France.
Wedl, Fr., (A.D.A.) ..... Vienna, Austria.
Herbst, Wilhelm, (A.D.A.) ..... Bremen, Germany.
Bryan, L. C., (A.D.A.) ..... Basel, Switzerland.
Hape, Samuel, (S.D.A.) ..... Atlanta, Ga.
Tiffany, L. McLane, (S.D.A.) ..... Baltimore, Md.
Summers, T. O., (S.D.A.) ..... Nashville, Tenn.
Selby, J. W., (S.D.A.) ..... Atlanta, Ga.
Walker, Mrs. J. M. ("Mrs. M. W. J."), (S.D.A.) ..... Bay St. Louis, Miss.
Prewitt, Miss Emma, (S.D.A.) .... Franklin, Tenn.
Crouse, J. N., (S.D.A.) ..... Chicago, Ill.
Wedgewood, J. C., (S.D.A.) ..... London, England.
McLeod, W. Bowman,* (S.D.A.) .. Edinburgh, Scotland.
Woodbury, Frank ..... Halifax, N. S.

* Deceased.

Report of the Committee on History.

THE history of dentistry and of the dental profession has in the past seemed to command so little attention from our societies and from our other educational institutions that it was peculiarly fitting that, at its very first meeting, our first really national association should have considered this neglected, but really important, subject worthy of some official action.

At the suggestion of the late Dr. R. Finley Hunt, of Washington, the following resolution was adopted:

"That a committee of three be appointed by the President to report at the next annual meeting a measure *looking to the preparation* of a full history of the dental profession."

The Committee was appointed, Dr. R. Finley Hunt, of Washington, Dr. Gordon White, of Nashville, and myself. It was a great misfortune to your Committee that at the very beginning of the work the one upon whose long professional experience we expected to rely, and whose judgment would have been of so much value, Dr. Hunt, died May 21, 1898, aged eighty-one years.

The other members of this Committee have had but one short conference, and, after a delay for which they ask your kind indulgence, now have the honor of submitting this preliminary report for your serious consideration.

In order to consider intelligently the preparation necessary for a future history it is desirable for us to understand a little about the efforts made in the past toward that end, the position taken by dental history in the literature of the profession, and it may not be unprofitable to realize later the interest taken in the subject by the dentists themselves.

In 1808 Duval published in Paris his small volume, "Recherches historiques sur l'art du dentiste chez les anciens."

Fitch in 1829 prefaced his "System of Dental Surgery" with a

short historical discourse, and about 1831 Georg Carabelli printed his work on the subject.

In 1836 Jas. Snell prefixed to his "Practical Guide" a "historical sketch of the rise and progress of dental surgery." In this learned little essay of fifty-five pages, fairly bristling with quotations in the original Greek and Latin, Mr. Snell says,—

"As no author has hitherto given any historical account of the rise and progress of the art, a slight sketch is prefixed to this work. It has long been the intention of the author to write a work wholly on this subject, as there is an abundance of useful and interesting materials to be found for the purpose, but the fear that such a work would not be generally acceptable has induced the author to suspend for the present the full execution of his original intention, and confine himself to the brief sketch now presented to the public."

In 1839 Alexander Nasmyth devoted the first volume of his "Researches on the Development of the Teeth" to a historical introduction on that subject of one hundred and sixty-five pages.

In 1842 Linderer devoted some space to historical matters, and in 1845 Desirabode published a work which was translated and published two years later in Baltimore, under the title of "Science and Art of the Dentist, and Historical and Chronological Notice of Works on Dental Art since Hippocrates."

We now come to the year 1849, and the well-known work by Chapin A. Harris, entitled "A Dictionary of Dental Science, Biography, Bibliography, and Medical Terminology." In the preface to this work Dr. Harris says,—

"It occurred to the author that much interest would be given to the work by inserting in it some brief account of the men who have been the pioneers to the advancement of this part of surgery, and whose genius, industry, and self-devotion are worthy of the grateful remembrance of the profession. In order to obtain materials for such memoirs, as well as other information proper to be recorded in a work like the one proposed, a circular setting forth the design and scope of the projected undertaking, and asking contributions of the kind above stated, was sent to every dentist in Europe and America whose address could be procured. But, unfortunately for the author and for those into whose hands the book may fall, the information contained in most of the responses which he received was not sufficiently definite to be rendered available; yet for the willingness manifested by those of his professional brethren who did respond, to assist him in carrying out the plan of the work, he takes this first public opportunity to return his grateful acknowledgments."

Fifty years have passed since the great Chapin A. Harris wrote

these words, but they express to-day very forcibly the sentiments of your present Committee.

In the *Dental News Letter* for January, 1859, there appears "An Historical Review of Dental Surgery from the Earliest Period to the Commencement of the Present Century." This was taken from the *London Dental Review,* and was a doubly translated version from Kurt Sprengel's "History of Medicine." In communicating this paper Mr. Hockley said,—

"That, deeming the subject of the early history of our profession of sufficient importance, he had set about collecting the materials necessary for writing its history, and for that purpose consulted, among others, the work of Sprengel, and, finding that the chapter upon operations relating to the teeth contained a historical summary, concluded to translate it, adding some of his own material in the shape of critical and explanatory notes."

The history was completed in the English magazine, but after two instalments the *Dental News Letter* merged into the *Dental Cosmos*, and the article was never finished.

In 1874 an effort was made by a publishing house to prepare a "History of American Dentistry and Dental Surgery, comprising Biographical Sketches of American Dentists, with Portraits on Steel." The proposed work met with expressions of decided disapproval from many prominent dentists and from several societies. It was stated in one protest that, "while we have no objection to a well-executed history of dental surgery, confined to no country and including its whole development, we cannot but look with disfavor upon" this book, which in their opinion savored more of personal advertisement, *with its portraits on steel,* than of anything else. The publishers then endeavored to get several distinguished members of the profession interested in the work, but the effort was not successful.

In 1877 Mr. Alfred Hill published his "History of the Reform Movement in the Dental Profession in Great Britain during the Last Twenty Years." In the preface to this book the author says,—

"The reasons which induced me to write this work were various. The principal one was a keen sense of justice due to those whose long-sustained labors were pre-eminently the cause, the effect of which is the present organized and improved condition of the dental profession. . . . It appeared to me an injustice to their memory to allow their names and their self-sacrificing endeavors to pass quietly into forgetfulness. . . . Moreover, it seemed to me very desirable that those who are so manifestly reaping the many solid and valuable benefits which are the outcome of

what has been accomplished should be not only made acquainted with the names of their benefactors, but have placed before them an outline of the way in which the many obstacles in the path of dental reform had been, one after the other, removed or surmounted. When the younger members of the profession learn what the condition of things actually was so short a time since, they will be naturally led to rejoice in their enfranchisement from so many of the disadvantages and disagreeables to which their predecessors had to submit. Also, by comparing what has been with what is, I am inclined to believe that they will more fully appreciate their present circumstances by a just estimation of the heritage thus handed to them, and seek by honorable conduct and scientific and practical attainments to uphold the dignity and promote the further advance of dental surgery in this country."

In 1883 and 1884 Geo. H. Perine's "History of Dentistry from the Earliest Period to the Present Time" appeared in the *New England Journal of Dentistry,* and in 1889 and 1890 the *Dental Review* contained two interesting papers by the late Dr. John J. R. Patrick, entitled "The First and Second Periods in the History of Dentistry." In the first of these very valuable essays Dr. Patrick wrote,—

"It is to be hoped that the time is not far distant when the profession everywhere will be convinced of the importance of becoming more intimately acquainted with the researches and views entertained on the subject of dentistry by some of the most intellectual men the world has ever produced. It is to be hoped that the profession will see the advantage and necessity of a dental encyclopædia or summary of dental knowledge; not a system, but a work that would rescue valuable papers relative to dentistry that are now resting in comparative obscurity in the archives of scientific societies, and that are now, in a manner, lost to the profession. . . . One great advantage the profession would have in the possession of such a work would be that when a new theory was advanced it could be tested by comparing it with doctrines of a similar nature advanced in former times. Certainly every age should profit by the experience of the preceding ones; but without a record of what has been accomplished each investigator commences a new series of trials, and wanders over the same grounds in search of truths which have been long ago discovered; or adopts theories that have been long ago discarded. The views of our predecessors may be regarded as beacon-lights set up to guide our footsteps from the pitfalls of error."

In commenting on this passage Dr. Wm. H. Trueman says,—

"The educational value of such a work as that suggested by Dr. Patrick would be beyond estimate. Not only would it unfold a mine of useful knowledge unknown and inaccessible to a vast majority of the profession, and would prove a vantage ground from which future investigators could begin their labors; but the knowledge of what has been done in the past, the insight it would afford of the men to whom we are so greatly indebted for much that

we know, and who are so often contemptuously spoken of simply because they and their labors are unknown, would widen out and expand our perceptive faculties."

In 1892 Dr. B. J. Cigrand, of Chicago, published his "Rise, Fall, and Revival of Dental Prosthesis." This work was the outcome of four lectures delivered before the students of a dental college, and the author says in the preface to the first edition,—

"Believing it necessary that the dental student in beginning the study of his chosen profession should know something of its antique birth, growth, and development, I felt it a duty incumbent on myself to open our acquaintance by cordially introducing to you the history of this branch of dental art and science, knowing full well that many of you before coming here had little knowledge relative to this interesting theme, on account of non-access to journals. . . . In many of our dental schools during the entire three or more years that the student serves within their walls not one sentence does he hear concerning the struggles and advancement of his professional forefathers."

We now come to the year 1894, and the *World's Columbian Dental Congress.* In the inaugural address by the President of the Congress it was said,—

"That dentistry to some extent is an ancient art cannot be questioned, but so meager are the references to it, in what remains that is authentic, that we may dismiss it from consideration at this time with the remark that nothing of value has come down to us from antiquity. The same is true of all the past up to the century preceding this. In fact, even as an art we may consider dentistry as modern, while as a science it is altogether modern," etc.

And the President goes on to say,—

"The valuable report which will be made by the Committee on History, with so many co-laborers, will, I have no doubt, give us a full history for the first time of early dentistry in this country. *This Congress would be well worth its cost if no other result should come of it but this.*" [Italics ours.]

Committee No. 18, "On the History of Dentistry in the United States," with nine members and many State associates, was formed to take the work in hand, and an abstract of eight pages was read to the Congress by the Chairman, the late Dr. Jeremiah Hayhurst, of New Jersey. With the venerable Dr. Hayhurst this work was a labor of love, and was to be a fitting and proper memorial due to our brethren of the past. He states that "the manuscript from which may emanate a valuable history is now in the hands of the Committee, who have to pass their judgment upon it and say whether or not it is such a book as is desired for publication."

It may be well to consider for a moment what this history was intended to be. The Chairman says,—

"The several State reports which have been forwarded to me from all parts of the country are of varied and mixed nature, containing points and matter in connection with every branch of dentistry,—and apparently in every possible shape,—so that they needed to be classified and arranged. The result of this classification and arrangement is as follows:

"I. General History.
"II. Dental Colleges and Schools.
"III. Inventions and Improvements.
"IV. Biographical Sketches.
"V. State Reports.
"VI. Manufacture of Porcelain Teeth.

"Much of the former parts of the work is made up from materials gathered from various sources; from the pages of the *American Journal of Dental Science, Dental News Letter, Watson's Annals,* and the *Dental Cosmos,* for the purpose of preparing a series of papers on Dental History, to be read before the New Jersey State Dental Society during a term of years. These had to be so altered and changed from a local application, to be adapted to a more general and wider scope, acceptable to our whole country."

After some remarks on the "Dental Colleges" and "Inventions and Improvements," the Chairman says,—

"While some of the States furnished a very full account, apparently embracing all the early practitioners, it is to be regretted that some of the States made mention of very few, and some have not a single biographical sketch in them. This is especially true of the older States, owing probably to the greater number of dentists in them, and the difficulty in finding any reliable and documentary evidence that might aid them in their researches. It would be very desirable to have had the material at hand to make a more general narration of the settlement and establishment of our profession all over the country. This department of the book might be almost indefinitely increased if it were not for the extreme modesty of the members of our profession, some of whom seem to experience a kind of nervous shock on seeing their names in print. . . . I cannot now call to mind a single State report in which there is not a claim by some individual of some important invention. And these claims are made in such a general way that even had I the power or authority to investigate, or even the inclination to do so, I could not settle the claim or pronounce it either valid or void. I took this matter up, and, revolving it in my own mind, came to the conclusion that these claims, as they are made, are the mere expressed opinions of the individual who makes them. With the determination of the justice of the same I had nothing to do."

Appended to this abstract was a *note by the editor:*

"An exhaustive report of the Committee on the History of Dentistry in the United States is in the hands of the Committee on Publication. The

report is made up of individual reports from the various States and Territories of the Union. It is to be regretted that the bulkiness of the work makes it impossible that it should be published as a part of the Transactions, and it is the hope of the Committee on Publication to see this report published on some similar suitable occasion, when it can be brought down to the date of publication."

It is to be regretted that the only special "result" of this great Congress in the way of history was the report of Committee No. 9, on "The History of Dental Legislation in This and Other Countries," by the Chairman, Dr. Wm. Carr, of New York.

Your Committee presumes that at the proper time this large collection of material may be at the service of the National Dental Association, so that the earnest efforts of the many collaborateurs may not be entirely lost, and that the over-sanguine inaugural remark of the President of the Congress may not prove to be forever an iridescent dream.

In 1896 George Pierce Geist-Jacobi, of Frankfurt-am-Main, Germany, published his "History of Dentistry" from 3700 B.C. until the present time. This author modestly says,—

"My history is not very detailed, I am sorry to admit. I had to remember the little interest the profession in Germany shows as to that theme, therefore I was obliged to omit many names of well-earned fame; it would be no very difficult task for me to write another volume of the same size without repeating anything. Perhaps I may, some day, if my little book meets with success."

This very interesting little work has met with a deserved success in Germany, and the author writes us that a second volume may be expected at an early date.

In 1899 Professor Roswell Park published his "Epitome of the History of Medicine," with a chapter entitled "An Epitome of the History of Dentistry," which was the outcome of an address to the students of the dental department, as the whole work was based upon a course of lectures delivered at the University of Buffalo. Professor Park says, "The history of medicine has been sadly neglected in our medical schools," and dedicates his work to his colleagues, who authorized and encouraged "this first attempt in the medical schools of this country to give systematic instruction in the history of the science which they teach."

That this was not the very *first* attempt may be seen in the fact

that over twenty-five years before, in the preface to Dunglison's "History of Medicine" it is said,—

"The history of the progressive steps in the development of medicine embraced in these pages is an embodiment of the course of lectures delivered by my father at the University of Virginia *many years since*. . . . It seemed to be the desire of Thomas Jefferson, at that time rector of the university, and of those associated with that illustrious personage in its government, that the student should learn something of the earlier progress of the science and the art, while at the same time pursuing a course of instruction in the usual technical details of a collegiate medical education. It was a wise provision that thus incorporated with the other features of a didactic course a knowledge of medical literature which, however valuable, is generally considered as an accomplishment rather than as an indispensable necessity. The students of those times were therefore, in this particular, a step in advance of the condition of their successors of the present day, who are left to gather their information on the previous state of medicine in whatever manner they may find it practicable or convenient to do so after graduation. Even at this period (1872), however, the difficulty arises that there is scarcely a convenient congenial work on the history of medicine to which they can have access, and the study of this subject is therefore usually wholly neglected."

It will be remembered that in referring to Dr. Cigrand's history we stated that it was the outcome of several lectures delivered before the students of a dental college. It is the opinion of your Committee that it would be well for the future culture of the dental profession if no class was allowed to graduate from any dental college without receiving the benefit of a short course of lectures on dental history. It is, to say the least, rather foolish to expect the busy young men of the future to always "uphold the honor of their profession" if they have but a very hazy idea of what that profession is.

It is all very well to talk eloquently once in a while, on festive occasions or in annual addresses, about Hayden and Harris, Gardette, Greenwood, and the Flaggs, not forgetting the dental poet, Solyman Brown. It is easy to weave laurel wreaths with our lips, but if we leave their memories to the tender mercies of the back numbers of various old magazines we must not blame the coming generation—that sensitive plant—if it promptly declines (as it will) to dig down very deep through the dust after them.

And there are other men, nearer our own time, but yet rapidly passing into history, whom it would be a pity to have forgotten,—Arthur, Barnum, Dwinelle, Webb, McQuillen, Atkinson, Garretson, and so many others. As Dr. Perry once expressed it,—

"I am impressed with the thought that we have a great deal to be thankful for in being members of a profession that can make such an array of names,—men who could grace any calling on earth at any time. It is proper that we should stop to historically consider these men, and that we should sometimes lay aside scientific questions to think of these things that really touch the heart so deeply."

And so your Committee considers it a necessary step in looking to the preparation for a history of the profession that not only the history should be prepared, but that the profession should be prepared for the history. And no better way can be found than in making the subject of dental history more of a feature in our colleges. It is certainly of as much importance as "dental jurisprudence," and it is to be hoped that the day is not far distant when every dental college will have its "lecturer on dental history."

Of these histories it is simply necessary to say that, with the exception of Dexter's, Cigrand's, and Geist-Jacobi's, these works are out of print, out of date, and inaccessible. Geist-Jacobi's history is, of course, in German; Dexter's book is somewhat difficult to obtain, and this leaves Cigrand's book as the only history on sale to-day in our language.

The "History of Dental and Oral Science in America," compiled by Dr. Jas. E. Dexter, and published under the auspices of the American Academy of Dental Science in 1876, merits a moment's consideration; not only because it is really our representative work, but because it points a moral. It is admittedly the best and only work we have of its class; it was published to celebrate the centennial year, and to commemorate a century of dental progress. It was a remarkable result to accomplish in less than ten months. At a meeting December, 1875, it was voted unanimously "to present in some suitable manner the claims of dentistry, or more properly oral science, at the coming centennial," and at the meeting September, 1876, the committee reported that they had prepared a history of dentistry in America during the past hundred years, and said that, "Its preparation, involving much labor and expense, is a free gift to the profession." This statement did not mean literally that copies were to be distributed to an eager multitude gratis, but it was, in the light of events, almost prophetic. It can be stated on the best authority that, printed in 1876, the number of copies was seven hundred and fifty. It had a little sale at first, but shortly that dropped off; and the price was reduced again and again, but without

taking the entire edition off the publishers' hands. In the four years from 1883 to 1887 only about twenty-five copies were sold, and finally the matter was closed out by the giving away of two hundred and forty-two copies in the year 1887.

With this account of the chief works upon dental history it may be thought that we have exhausted the subject as well as your patience, but to prove that this is not so we have appended to this report a list of one hundred and fifteen titles of books and important articles relating particularly to the history of dentistry. And then, of course, we have the many older dental magazines and transactions, which are histories in themselves.

In this place we must speak of the inestimable value of the dental department of the Army Medical Museum and Library in a matter of this kind. Nearly all the works mentioned in the appended list are to be found there, as well as vast quantities of other data. Without such a library as that a proper history of dentistry is impossible of accomplishment, and the profession is greatly indebted to Dr. Donnally and the committee having that matter in charge for the admirable results of their work. More attention is now given to dental bibliography than ever before, and they are endeavoring to make the collection as complete as possible by buying everything not now on file. They have all the new works, and take, we are informed, forty-seven dental journals. Every member of the profession should take a pride in this institution, particularly as it is the only way for us to secure a complete collection of dental literature under one roof,—a matter of infinite value to the future dental historians.

Your Committee is indebted to the librarian, Major Merrill, for the courteous loan of proof-sheets of the new catalogue.

Fortunately we have a few other libraries devoted to dental subjects, notably that of the Odontological Society of London, and last, but not least, the great collection of Dr. Henry J. McKellops, of St. Louis, in some respects the most complete library in the world on the subject.

In order to *see what interest* would be taken by the dentists themselves your Committee sent out several months ago some four hundred circulars, accompanied in many cases by personal letters to members of the Association and others supposed to be interested in the work.

THE NATIONAL DENTAL ASSOCIATION—*Committee on History.*

Dear Doctor,—At the first meeting of the Association a committee was appointed to report a *measure looking to the preparation* of a full history of the dental profession. This Committee will make a report at the meeting next August, and the character of the report will depend somewhat on the interest taken in this important subject by the members of this Association and the profession generally.

All must admit the necessity for a full, carefully prepared and *authoritative* history of dentistry. The time (as the century closes) is most propitious, and the longer it is delayed the more difficult it will be to secure a reliable result.

The Committee will be greatly helped in making its report by any interest you may take in this matter, and would be glad to have your replies to the queries on the next page, together with any advice, suggestions, or objections you may be pleased to give.

GORDON WHITE,
CHARLES MCMANUS, *Chairman.*

Four questions were asked:

1. Will you please name any books, pamphlets, manuscript reports, in fact any matters of interest you may possess, which, at the proper time, might be available for the history?

In the answers to this question the usual works were mentioned, and particular stress laid upon the value of the older files of the dental magazines and the transactions of the early societies. In many cases the writers freely offered the use of their libraries.

2. Will you give the names and addresses of any dentists in your vicinity who have written on the subject, or are interested in dental history?

In answering this question many of the older men of this and other associations were referred to. It is significant that in many instances men were spoken of who *might* have been of great service if the collecting had *begun years ago.* Your Committee has endeavored, without by importunacy defeating its purpose, to get some of the veterans of the profession interested.

3. Should the proposed work, in your opinion, be confined to a history of the profession in America, or should it be of dentistry from the earliest times all over the world?

To this query the answer was in a majority of letters that *of course* it should be a *full* history of the world's dentistry from the earliest times, and in a minority of answers (from men whose opinions are of great value) it was said that *of course* it should be confined to America. These answers, in a way, simply resolve

themselves into a matter of *expediency,* and the fear that in attempting too much we should injure the general result of the work.

4. As it is necessary for us to report on the probable financial success of the idea, would you be willing to subscribe, at the proper time, for a satisfactory history of the dental profession?

This question was asked (of members of this Association only) for two reasons. The first was that Dr. R. Finley Hunt had expressed the idea that "the battle will be more than half won if we can have and report good grounds for a reasonably certain belief that sufficient can be obtained to pay expenses." The second reason was that it furnished a question that any one could answer. In nearly all the letters received the answer was an emphatic "yes."

As a whole, these letters were encouraging. A great deal of kindly interest was expressed, and in nearly all cases the writers offered to help in any way they could. This is true not only of the members of the profession in America, but in Europe.

Professor W. D. Miller, Berlin, Germany, writes,—

"Of course a universal history of dentistry would be very interesting and valuable, but its compilation would naturally cost an immense amount of labor."

Mr. Chas. S. Tomes, London, England, says,—

"I think it would be a very good idea. If you will tell me just what you want,—*i.e.,* what period you will start upon,—I will give any help I can."

Dr. G. P. Geist-Jacobi, Frankfurt-am-Main, Germany, writes,—

"Of course I not only believe it advisable but absolutely necessary for our profession to learn a little more of our past, as history always will be the instructor of the present. If I can be of any service to you, please do not hesitate to call upon me."

Dr. J. Leon Williams, London, England,—

"I can assure you of my deep interest in the subject, and to express the hope that your committee will receive sufficient encouragement and support to complete the work. It is, as you say, important that the work be commenced at the earliest possible date. There are now men still living whose lives pretty well cover the whole history of dentistry in America, but with their passing away much valuable material for a history of dentistry would be irrecoverably lost. If I can at any time render you any assistance in the work, I shall be most happy to do so."

Dr. I. B. Davenport, Paris, France,—

"As far as possible it appears to me a general history would be more desirable than a history of dental science in America; but I see enormous difficulties in the way of writing such a history,—one that would satisfy the

profession of other countries. . . . It will be easier to outline the history of the rise and development of dental science than it will be to assign correct places to those who have had the bringing of it about. Finally, it appears to me that a volume might be compiled on the history of dental science up to the founding of dental schools, or up to a certain date, say, 1850 or 1860; but I doubt if it is not too soon to hope to write a history of more recent events, the most to be hoped for being the systematic recording of events as preliminary to a future history after such preliminary reports made at intervals (say annually, or as often as material accumulates) have had time to season and bring around them the side-lights of experience, criticism, and truth."

Dr. N. S. Jenkins, Dresden, Germany,—

"I am in sympathy with the idea of a history of dentistry, and my impression is that it would be best for the Committee to consider a general history rather than an exclusively American one, although naturally the American chapter would be the most interesting and important."

Dr. G. V. Black writes,—

"I have a notion that any history of dentistry that is undertaken seriously should include the whole world, and that it should be a history of the progress of thought on dental subjects, not a history of men at all, except incidentally as certain men have given character or origin to the thought of the profession in its progress.

"This should be taken up, subject by subject, carrying each subject through some certain series of years, one after the other, and then advancing through another series of years up to the present time. Just what these periods might be would be a subject for careful consideration, but this is my idea of what a history of dentistry should be,—not a history of men, not a history of American dentistry, but a history of the progress of thought in dentistry."

In the course of a long and very interesting letter, Dr. Louis Ottofy, now of Yokohama, Japan, says,—

"A history of dentistry of the world would be infinitely more valuable than if it was confined to the United States alone; but, on the other hand, the work would be simply enormous. . . . As to the question of financial success, I hold the following views, that histories are not profitable works unless they are subscribed for in advance, and from a spirit of professional or public benefit. That is, a history of the profession is not a work of necessity to make a good operator or a successful practitioner, but merely useful as an entertainment or for scientific pursuit, and is limited to use for men who are interested in the progress of the profession aside from the mercenary view of one's own pocket."

Dr. Ottofy then gives many valuable facts about dentistry in Japan, and an elaborate idea as to the financing of the work which will be of great value to the future committee.

Dr. Jas. Truman, in an editorial in the *International Dental Journal* for May, 1899, said,—

"The preparation of such a history will be a very serious task, and every year allowed to lapse increases the difficulty of its accomplishment. If it were confined solely to a history of dentistry in the United States and Canada it would be a matter of great labor and conscientious research; but should it be proposed to extend this to a history of dentistry throughout the world, it would become a task which, it is feared, would be impossible of accomplishment. If such a history is attempted it should be confined to this country, and there is quite sufficient of interest here to occupy the historian for a long period. . . . What is needed is a condensed compilation of absolute and verified statements of historical facts. These may be difficult to procure, but there are many yet living who have passed through a large portion of the work of the last half of the present century, who could give valuable aid in this direction."

Dr. Wilbur F. Litch, in an editorial in the *Dental Brief* for May, 1899, wrote,—

"During the centennial year a history of dental and oral science in America was prepared and published under the direction of the American Academy of Dental Science, of Boston, Mass. The work, considering the brief time for its preparation, was of decided merit, and placed in a form available for reference much valuable material. Nearly a quarter of a century has elapsed since its publication. As the years have gone by dentistry has not stood still, and all the great and significant changes which have marked its growth and progress await record in an authentic history. Such a history would be a fitting legacy from the closing to the coming century of dentistry."

Dr. Wm. H. Trueman, of Philadelphia, our greatest authority on the subject of the early history of dentistry in this country, writes regarding the works of the early writers,—

"They seem to have a common origin and do not bear the impress of careful study. They have a value, to be sure, but the historian must, if he would do thorough work, go behind them and run the various suggestions they contain to the bottom facts. . . . I am very strongly impressed and would advise that the first effort should be to make a history of dentistry in our own country. There is sufficient material at hand to make, perhaps, more than one volume, and I would begin with New England, for it was, I am persuaded, from Boston that dentistry has spread. . . . As to the best methods of getting such information, it is an art which must be learned, to ferret out, weigh, compare, and properly estimate the accuracy and value of information. But very few of those who have written upon dental history have used as they should the 'sieve.' Merely putting together little scraps gathered here and there, without being reasonably sure that they are reliable, is not history making."

This Committee desires to express its thanks to Dr. Wm. H. Trueman for his help and advice.

The following societies have passed resolutions in reference to the subject of a dental history:

The Northeastern Dental Association, fully realizing the necessity for a complete and authoritative history of the dental profession, and believing that the present time is most auspicious, desires to express its hearty appreciation of the efforts now being made by the *National Dental Association* looking toward the preparation of this much-needed work.

Resolution by the Southern Branch National Dental Association, offered by Dr. B. Holly Smith:

"I move that this branch of the National Dental Association appreciates the importance of the work of the Committee on the History of our Profession, and pledges our support."

Carried.

In conclusion, to sum up the whole matter, your Committee is of the opinion that, whereas a complete history of dentistry may some day be the result of the effort now being made, this Association must confine its first efforts to the history of dentistry in America. Naturally the earlier periods should first receive attention. If we divide (as has been suggested) the history into three periods: First, *from the earliest colonial times to the real starting of the profession in 1839-40;* second, *from the latter date taking up the intensely interesting history of the professional growth of the next twenty-five or thirty years, which will carry the work to 1865 or 1870;* third, *from 1865-70 to the present time.* This latter period may be dismissed with the remark that it is too recent for any serious historical consideration for some years to come.

As to the collection of data, for the *first period* much of it will have to be grubbed for in the old newspapers, and, thanks to the flamboyant advertisements of some of the early practitioners, this is made possible; the transactions of genealogical societies, local histories, and other records of this nature.

Much of the data of the *second period* (1840-1870) is to be found in the earlier dental journals, and, these being readily accessible, may be dismissed here. However, it is with this part of the preparation of the work that the memoirs, recollections, personal experiences of many of the older practitioners will become of great importance, and the sooner this collection is made the better. Your Committee has attempted this work, and with some little success,

but further persistent, if not importunate, effort is necessary. It is to be hoped that the older and more experienced men will take an interest in this feature of the preparatory work.

It will be necessary to get the various State societies of the country interested, so that through them local historical matters can be worked up.

Every dental society, with its librarian, and in many instances no library, its editor a sinecure, its committee on this and that, should have a *permanent historian,* for history, good or bad, like the poor, we have always with us.

The general subject of the preparation for a dental history should be brought forward and considered as a matter of importance at the meeting of the International Dental Congress at Paris in 1900.

As for the future publication of a history, if it is to be ever worthy of this Association, if it is to be *authoritative,* every possible means of making it correct must be used. This Committee suggests that if a certain part, the first period, be taken up and prepared, it might be presented before this Association, published in the Transactions and the dental journals, and the most searching criticism invited. This would give an opportunity for correction and addition before it appeared in a permanent form, and thus avoid the remark once made of Daniel Defoe, that he wrote "history minus the facts."

The financial question is too important to be passed over, but it must be further considered by a larger, stronger committee. One correspondent settled the matter very beautifully with the advice, quite seriously given, that we should get one thousand dentists to subscribe twenty-five dollars each, twenty-five thousand dollars, etc. Remembering the efforts of Dr. Crouse and the Protective Association, this advice seems rather visionary. Another piece of advice given to the Committee was that the Association appropriate a certain sum of money for, as was said, a "hack" writer, and let him travel about the country and collect data and write a history. A literary "hack" would probably produce a "hack" history, and that would not be worth while. It is true that it may possibly be necessary to put the data at some future time in the hands of some literary man for final editing, but that man will have to be very well paid for it. As dentists we cannot expect to get good work for cheap prices.

Another man (of great experience) writes, "Do not bother about the financial part of it. Time enough for that when you come to publication, which should not be for five or ten years at least. The immediate duty is the accumulation of material before it perishes." It must be remembered, however, that it will cost money to collect certain data.

Therefore, we suggest and recommend that a *permanent committee on history* be appointed to continue this work. That said committee be composed of not less than five or, if limited, more than ten members thoroughly interested in this subject and willing to work. That said committee be authorized to invite, when it is deemed for the good of the work to do so, certain distinguished members of the dental profession interested in historical matters to be *"advisory members."*

With a larger, stronger, and *permanent* committee this matter can be carried forward, let us hope, to the point where some time in the future a history of our profession worthy of this Association may be presented to the dentists of the world.

[NOTE.—Here follows a list of one hundred and fifteen titles of works, papers, etc., relating to dental history which we will do you the favor not to read, but which the Committee hopes will be included with the report and printed in the Transactions for future reference.]

CHARLES MCMANUS, *Chairman;*
GORDON WHITE.

Audibran (J.). Traité historique et pratique sur les dents artificielles incorruptibles. (Paris, 1821.)

Benicio (A.). Breve noticia sobre a arte do dentista no Brazil. (Trans. Pan-Amer. Dent. Cong., 1893; Wash., 1895, pt. 2, p. 1900-1905.)

Bertherand (E.). Les dentistes indigènes. (*Gaz. Méd. de l'Algerie,* Alger., 1857, vol. ii, p. 172-174.)

Black (G. V.). Historical sketch of dental nomenclature. (Trans. W. C. D. C., vol. ii, p. 848.)

Boice (A.). History of classification of dentists by the census bureau. (Report of Com. Trans. A. D. A., 1895, p. 150.)

Bristol (L. W.). Personal recollections of a dentist of the early days. (*Ind. Pract.,* 1884, vol. v, p. 662-670.)

Burchard (Henry H.). The progress of dentistry. (Editorial, *Stomatologist,* May, 1897.)

Cameron (D. A.). Advice on care of the teeth, with popular history of the dental art. (———, 1838.)

Carr (Wm). History of dental legislation. Trans. W. C. D. C., Com. No. 9, 1894, vol. ii, p. 959.)

Chittenden (C. S.). Historical reminiscences. (*Ind. Pract.*, 1886, vol. vii, p. 65-73.)

Cigrand (B. J.). The rise, fall, and revival of dental prosthesis. (Chicago, 1892-93.)

Crowley (C. G.). Dental bibliography: A standard reference list of books on dentistry published throughout the world from 1536 to 1885. (Phila., 1885.)

David (T.). Les origines françaises de la chirurgie dentaire. (Coulommiers, 1886.)

——— Les dentistes de la cour de France. (*Odontologie,* Paris, 1887, vol. vii, p. 472-484.)

Desirabode et ses fils. Nouveaux éléments complets de la science et de l'art du dentiste; suivis d'une notice historique et chronologique des travaux imprimés sur l'art du dentiste dupuis Hippocrate jusqu'à nous. (Paris, 1845.)

——— Science and art of the dentist and historical and chronological notice of works on dental science since Hippocrates. (Trans., Baltimore, 1847.)

Dexter (Jas. E.). A history of dental and oral science in America. (Phila., 1876.)

Donnally (Wms.). An opportunity for a great national dental museum and library. (Trans. A. D. A., 1895.)

Dukesz (J. M.). A fogászat fejlödésének története Magyarországban. [History of the development of dentistry in Hungary.] (Millen. ország. fogonosi cong., Budapest, 1896.)

Dunn (C. W.). Artificial dentistry among the Etruscans. (Florence, 1894.)

——— (Wm., Jr.). Dentistry one hundred years ago. (*Inter. Dent. Jour.*, 1892, vol. xiii, p. 344.)

Duval (Jacques-Réné). Recherches historiques sur l'art du dentiste chez les anciens. (Paris, 1808.)

——— Conceils des poètes anciens sur la conservation des dents. (Paris, 1803.)

——— The advice of the ancient poets upon the preservation of the teeth. (Trans. J. Atkinson, Lond., 1820.)

——— Notice des travaux enterpris sur les dents en France dupuis, 1790. (Paris, 1827.)

——— Notice historico-médicale sur les Normands. (Paris, 1834.)

——— Notice historique sur la vie et les ouvrages de M. Jourdain, dentiste. (Paris, 1816.)

Eames (W. H.). Scythian dentistry. (*Indep. Pract.*, 1886, vol. vii, p. 290-292.)

Fitch (S. S.). System of dental surgery—preliminary historical discourse. (New York, 1829.)

Fort (Geo. F.). The medical economy during the Middle Ages. (New York, 1883.)

Francis (Chas. E.). Reminiscences. (New York, 1896.)

Füellgraff (A). Dentistry in Austria. (*Dental Register,* 1884, vol. xxxviii, p. 529-532.)

Fyodoroff (P. F.). Polozhenïe zubovrachevaniya u nas ï za granitsei. [The position of dentistry in Russia and abroad.] (*Vrach,* St. Petersburg, 1894, vol. xv, p. 199, 233, 261.)

Geist-Jacobi (G. P.). Geschichte der Zahnheilkunde von Jahre 3700 v. Chr. bis zur Gagenwart. (Tübingen, 1896.)

——— Hippokrates über Zahnheilkunde. (*Corbl. f. Zahn.,* Berlin, 1894, vol. xxiii, p. 304.)

Godon (C.). L'organization de la profession de dentiste en France; questions du jour. Lettre à M. Monod. (Paris, 1892.)

——— and *Ronnet* (A.). L'art dentaire aux états-unis en 1893. Une mission en Amérique. (Paris, 1894.)

Grevers (John E.). Een historische schets der Tandheelkunde. (Amsterdam, 1895.)

Griffith (W. F.). The claim of ancient dentistry. (*Items of Interest,* 1897, vol. xix, p. 908-12).

Goddard (C. L.). History of dentistry in California. (*Pacific Coast Dentist,* San Francisco, 1893-4.)

Harris (C. A.). A dictionary of dental science, biography, bibliography, etc. (Phila., 1849.)

Hayhurst (J.). An abstract of the history of dentistry in the United States. (Report of Com. No. 18, W. C. D. C., 1894, vol. ii, p. 983.)

——— Papers on dental history.

Henoque. Esculape et Thémis, ou les dentistes au xix° siècle. (Paris, 1854.)

Hill (A.). The history of the reform movement in the dental profession in Great Britain during the last twenty years. (London, 1877.)

Hitchcock (T. S.). List of early dental writers. (*Items of Interest,* vol. xx, p. 873, Nov., 1898.)

Holmes (O. W.). The claims of dentistry. (Boston, 1872.)

How (W. S.). Some phases of dental literature. (*Inter. Dent. Jour.,* vol. x, p. 466.)

Huey (Robt.). The progress of dental education in America. (*Dental Cosmos,* vol. xxxix, p. 958.)

Hunt (R. Finley). The dental profession, some points in its history. (*Dental Cosmos,* vol. xxxviii, p. 777.)

Jakowski. Revelations sur les progres de l'art dentaire. (France, 1858.)

Jones (A. Sr.). Dentistry among the ancient Greeks and Romans. (*J. Brit. Dent. Assn.,* Lond., 1884, vol. v, p. 404-413.)

Jourdain (M.). Traité des maladies et des opérations réellement chirurgicales de la bouche et des parties qui y correspondent, suivi de notes, d'observations, consultations interessantes, tant anciennes que modernes. (Paris, 1756.) [Trans. in English, Phila., 1851.]

Katayama (A.). Dentistry in Japan. (*Dental Review,* Chicago, 1890, vol. iv, p. 316-320.)

Kimball (H.). On the present state of dental surgery as practiced in the United States. (*Bost. Med. & Surg. Jour.,* 1834-35, vol. xi, p. 39-45.)

Kimball (R. H.). Dentistry in the Orient. (*Dental Review,* Chicago, 1896, vol. x, p. 551.)

Laforesterie (E.). Essai historique et critique sur les dentaires. (Paris, 1886.)

Lecaudey (E.). L'avenir de l'art dentaire en France (étude critique sur le projet). (Paris, 1888.)

Ledyard (F. K.). Ancient dentistry, answer to Dr. Trueman's paper. (*Items of Interest,* N. Y., 1898, vol. xx, p. 85-87.)

Lennmalm (H.). World's history and review of dentistry. (Chicago, 1894.)

Linderer (C. J.) and *Linderer* (J.). Handbuch der Zahnheilkunde. (Berlin, 1842-48.)

——— (J.). Die Zahnheilkunde nach ihrem neuesten Standpunkte. (Erlangen, 1851.)

Lord (Benj.). Early dentistry in America. (New York, 1893.)

Macarovici (P.). Starea dentisticeî si a dentistiler in România. (*Romania Med.,* Bucuresci, 1896, vol. iv, p. 141-144.)

MacLeod (W. B.). The growth of dentistry in Scotland. (*Trans. Odont. Soc. Great Brit.,* Lond., 1892-93, vol. xxv, p. 109-119.)

McManus (Jas.). Early record of dentists in Connecticut, 1800-1864. (Hartford, 1896.)

——— A professional review, 1864-1898. (Hartford, 1898.)

——— (Charles). One of the present needs of the profession—a history. (*Dental Cosmos,* Jan., 1898.)

——— The need of a dental history. (*Inter. Dent. Jour.,* Jan., 1899.)

Manson (Thos.). Ancient and modern history of the teeth. (New York, 1848.)

Maury (F.). Treatise on the dental art, with list of authors who have written on dental science. (Phila., 1843.)

Merritt (Charles). Some personal recollections. (*Dent. Pract.,* Buffalo, Jan., 1898.)

Miller (W. D.). Prehistoric teeth. (*Ind. Pract.,* vol. v, p. 40-43.)

Mirimonde (L. P. de). L'art du dentiste en 1883. (Paris, 1883.)

Nasmyth (A.). Researches, historical introduction. (London, 1839.)

Park (Roswell). An epitome of the history of dentistry; chapter in his epit. of hist. of med. (Phila., 1899.)

Pardo. Les dentistes en Turquie. (*Gaz. Méd. d'Orient,* Constant., 1890-91, vol. xxxiii, p. 69-85.)

Patrick (J. J. R.). The first period in the history of dentistry. (*Dental Review,* Chicago, July, 1889, vol. iii, p. 426.)

——— The second period in the history of dentistry. (Trans. Ill. Dent. Soc., Chicago, 1890, vol. xxvi, p. 99-119.)

Perine (Geo. H.). A history of dentistry from the earliest period to the present time. (*N. E. Jour. of Dent.,* June, '83, vol. ii, p. 161; July, p. 199; Sept., p. 269; Nov., p. 343; 1884, vol. iii, p. 19, 50, 169, 211, 361; also abstract *A. J. Dent. Sci.,* Balt., 1884-85.)

——— A historical reference to mechanical dentistry. (*Dental Headlight,* Nashville, 1883, vol. iv, p. 115-123.)

Read (E.). Ancient dentistry. (Proc. Am. Assn. Adv. Sci., Cambridge, Mass., 1871, vol. xx, p. 409-414.)

Richardson (B. W.). Historical notes on the science and practice of dentistry in England. (*Arch. Dent.,* Lond., 1885-86, vol. i, p. 102, 225, 319.)

Ricois (A.). Le progrès dans l'art dentaire. (Paris, 1888.)

Saint-Olive (P.). Hygiène et prosthése dentaire chez les Romains. (*Gaz. Méd. de Lyon,* 1861, vol. xiii, p. 551-560.)

Smith (Mayo G.). A popular treatise on the teeth, containing a history of the dental art, etc. (Boston, 1848.)

Snell (Jas.). Practical guide and a historical sketch of the rise, and progress of dental surgery. (Phila., 1832.)

Sprengel (Kurt). Versuch einer pragmatischer Geschichte der Arzneikunde. (Halle, 1792-1803.)

——— Geschichte der Chirurgie. (Halle.)

——— Histoire de la médecine dupuis son orìgine jusqu' au dix-neuvième siècle. (Trans. from the German by J. L. Jourdain, Paris, 1815, 1832.)

——— A historical review of dental surgery from the earliest period to the commencement of the present century. (From "Geschichte der Medizin," trans. from the French of J. L. Jourdain, with critical and explanatory notes by A. Hockley.) (*Dental Review,* London; *Dental News Letter,* Phila., 1859, vol. xii, p. 120-282, and when changed to *Cosmos* never finished.)

Steinberger (P.). Ueber die geschichtliche Entwicklung der Zahnheilkunde und ihren gagenwärtigen Standpunct in Wissenschaft und Praxis. (*Oesterr. Ztschr. f. prakt. Heilk.,* vol. xiii, p. 421, 446-466, Wien, 1867.)

Sternfeld (Alfred) und *Zellner* (Karl). Zahnärztliche Bücherkunde; bibliographisches Verzeichniss von Büchern, akademischen und sonstigen Abhandlungen, soure der in medizinischen und naturwissenschaftlichen Zeitschriften veröffentlichten Aufsätze über das gesammte Gebiet der Zahnheilkunde; Alphabetisch geordnet und mit eingehender wissenschaftlicher Uebersicht. (Karlsruhe, 1891.)

Talbot (E. S.). Historical address. (*Int. Dent. Jour.,* vol. xii, p. 510.)

Tayac (D.-A.). Les progrès de l'art dentaire historique et description de l'art du dentiste. (Paris, 1890.)

Terry (C. T.). Prehistoric decay of the teeth. (*Ind. Pract.,* vol. viii, p. 27.)

Thackston (W. W. H.). American dentistry. (Trans. Amer. Acad. Dent. Sci., Boston, 1891.)

Trueman (Wm. H.). The advent of dental science in the United States. (*Dental Cosmos,* Sept., 1896, vol. xxxviii, p. 9.)

——— A chapter in dental history and bibliography. (*Inter. Dent. Jour.,* 1897, vol. xviii, p. 431.)

——— The dawn of modern dental literature. (*Inter. Dent. Jour.,* 1898, vol. xix, p. 333.)

——— Gold shell crowns one hundred and fifty years ago. (*Inter. Dent. Jour.,* vol. xviii, p. 639.)

——— Prophylactic dentistry a century and a half ago. (*Dental Pract.*, Buffalo, 1898, vol. xxix, p. 97.)

——— Evolution of dental materia medica (*Items of Interest,* Dec., 1898, vol. xx, p. 896.)

——— Ancient dentistry: some errors in Dr. Ledyard's paper corrected. (*Items of Interest,* N. Y., 1897, vol. xix, p. 903.)

——— Pyorrhœa alveolaris from a new standpoint. (*Int. Dent. Jour.*, vol. xvii, p. 774, p. 824.)

——— Glass fillings, jacket crowns, etc., a scrap of their history. (*Inter. Dent. Jour.*, vol. xvi, p. 353.)

——— List of early dental writers criticised and corrected. (*Items of Interest,* vol. xxi, p. 164, March, 1899.)

Truman (Jas.). Annual address. (Trans. A. D. A., 1897.)

——— Spurious history. (*Inter. Dent. Jour.*, vol. xvi, p. 777.)

Umgren (O.). Oefversigt af tandläkarkonstens historiska utveckling. [Historical sketch of development of art of dentistry.] (Stockholm, 1877.)

Van Marter (J. G.). Some evidences of prehistoric dentistry in Italy. (*Ind. Pract.*, 1885, vol. vi, p. 1.)

——— Further evidences of prehistoric dentistry. (*Ind. Pract.*, 1886, vol. vii, p. 57.)

Waite (Wm. H.). More prehistoric dentistry. (*Ind. Pract.*, vol. vi, p. 195.)

Westcott (A). History of adhesive gold foil. (*Dental Cosmos,* vol. xii, p. 57.)

——— History of impressions in plaster. (*Dental Cosmos,* vol. xii, p. 169.)

Wetherbee (I. J.). The past and future of the dental profession. (Address, Mass. Dent. Soc., Boston, 1866.)

Williams (J. L.). General Washington and his dentist. (*Bost. Med. and Surg. Jour.*, 1875, vol. xcii, p. 726.)

Woodward (Marion L.). Paul Revere, an early Boston dentist. (*Psi Omega Dent. Jour.*, Boston, 1897, vol. i, p. 14.)

Report of Committee on the Appointment of Dentists to the Army and Navy.

TO THE NATIONAL DENTAL ASSOCIATION: The matter of this Association promoting legislative provision for the appointment of dental surgeons to serve those engaged in the military and naval defense of our country was introduced at our Omaha meeting, and not only failed to call forth enthusiastic indorsement, but the agitation and discussion of the subject were deprecated by some of our most judicious members.

It was, however, later agreed to refer the subject to a committee, with instructions to report to this meeting. Immediately upon our appointment as members of this committee we began a diligent and painstaking inquiry, commencing with a number of the members present at that meeting and continuing until the views of a large number of representatives of the profession in America were obtained. With but a single exception, every one whose name you would recognize agreed that, so far as the honor and dignity of our profession are concerned, it were better that there should be no legislation on the subject than that there should be legislation placing the army and navy dental surgeon in a position, relatively to the army surgeon, inferior to that accorded to his profession relatively to the medical profession by the State universities, by legislative and judicial pronouncement, and by the public estimate of the status of the educated specialist of any branch of the healing art. This phase of the subject concerned your committee more than all else connected with it; not that we nor those we represent are personally wanting in humane feeling for the self-sacrificing men of our army and navy (whose ever-present need of the dental surgeon's service is increased many-fold by their extraordinary hardship in foreign lands beyond the reach of such service), but because we could not believe the dental profession would sanction

the legalizing of an invidious distinction between the army surgeon and the specialist, knowing as we do that the unpleasant consequences would not be confined to the few under military environment, but would extend to and affect the civil status of the whole profession.

We sympathize with the few dentists who have entered the hospital corps, or in some other irregular way have acquired the opportunity of rendering dental service to a very limited proportion of the army, and who believe such sacrifice necessary as an entering wedge—as one now in such service in the Philippines expressed it—to a general provision for army dental surgeons; yet we can imagine nothing more detrimental to the attainment of the object sought.

We hold that it is the duty of the Government, for humanitarian and economic reasons, to provide the army and navy with a corps of dental surgeons comparable in professional education and efficiency to the corps of surgeons. We believe we are confirmed in this by the past and present position of the profession. The first and most natural would be a legislative or a departmental requirement that a certain proportion of those entering the service as army surgeons should, in addition to the qualification now required, be qualified to perform the function of a dental and oral surgeon. The number should be sufficient to meet the needs of the service, and assigned under prevailing customs. Such a provision need not in any way disturb the ordinary operations of the medical corps nor affect the *esprit de corps* of its members. The alternative method contemplates the organization of a distinct branch of the medical corps under the supervision of the Surgeon-General, but otherwise its control and direction to be under its own officers, and, in respect to rank and the right to promotion through the grades below that of Surgeon-General, to be under the same rules and conditions as are applicable to army surgeons.

In our opinion there is no other way by which the operation of such a corps could be made effective, efficient, and satisfactory; no other way of obtaining competent service and maintaining professional relations. In regard to other aspects of the subject, we as a profession have no responsibility, and we recommend that, in the event of proposed legislation relating to the subject, this Association should limit its efforts to an attempt to secure a proper status

for the army and navy dental surgeon and his placement under conditions favorable to his highest degree of efficiency.

We may as good citizens, humanely disposed to our country's defenders, and knowing their need in the premise better than it is possible for others to know, use with propriety our information and influence with members of the Senate and House, of the army and navy, and of the War and Navy Departments, that on them may rest the responsibility of the suffering, loss of time, and acquirement of permanent diseases and disabilities through failure to provide timely service.

There has been no naval legislation recently with which this subject could be conveniently connected. The conditions in the navy are so entirely different from those pertaining to the army, and present so many more obstacles to the inclusion of dental surgeons in its service, that the Surgeon-General has not yet, though we believe quite willing, been able to find an expedient plan by which the need of the navy in this regard may be met.

As a matter of history, it may be added to this report that the Military Affairs Committee of the House of Representatives offered to the House an amendment to H. R. No. 11,022, known as the Hull Army Reorganization Bill, providing, as an addition to the medical corps, for "a hundred dentists, with rank, pay, and allowances of a first lieutenant, mounted, who shall be graduates of a dental college, and shall pass a satisfactory professional examination." The "rank" proposed corresponds to the lowest grade of assistant surgeons, and the pay and allowances amount to $1600.

The Hull bill as recommended to the House provided for five hundred medical officers on a basis of one hundred thousand men for the whole army, and the committee amendment for one hundred dentists was made on the same basis. When this part of the bill came up for action on January 30, 1899, a peculiar political condition confronted the House, which made it necessary for the Military Affairs Committee to ask the House to amend every section of its own bill.

The committee reduced the number of medical officers asked for from five hundred to two hundred and thirty-five, and would probably have reduced the number of dentists to about sixty and given them the right of promotion, unintentionally omitted in the original amendment, and provided a more satisfactory grading, but the zeal

of Representative Cox, of Tennessee, led the minority in securing the total rejection of the amendment. We know personally members who acted with the minority against almost every feature of the bill who would have gladly supported the amendment if they could have done so independently of party obligations.

The Surgeon-General of the army was not an advocate of the provision for dentists. When questioned by the Military Committee he spoke of it as an innovation, as contrary to established policy, but admitted that, in his opinion, dentists are needed, as are hospital stewards, pharmacists, and others of the hospital corps.

After the amendment was made providing for dentists of the grade of first lieutenant he assented to the suggestion of this committee that they should have the right of promotion, but was not impressed as fully as we would like with the suggestion that their efficiency would be greatly enhanced by providing grades for the more effective direction of the operations of the corps and as an inducement for a more competent class to offer their services.

Without the urgent advocacy of the Surgeon-General or the wisely-directed efforts of its advocates in Congress, it is only by chance that such a measure may be incorporated in the army legislation of the near future, but it will some day be adopted as a measure of humane interest in the soldier's comfort and welfare, of business economy in preventing the loss of his service in times of its special need, and in preventing the cost of his maintenance when occasionally unfit for duty and when permanently disabled by such pensionable diseases as chronic indigestion and chronic diarrhea, which so often have their beginning in easily prevented diseases and disorders of the mouth and teeth.

Respectfully submitted,

M. F. Finley,
C. S. Butler,
Wms. Donnally,
Committee.

Report of Committee on Museum and Library.

THE importance and value of creditable national dental museum and library collections has been repeatedly urged upon the dental profession during the last four years, and your attention has also been called to the fact that the Government has established and will permanently maintain such collections at the national capital as a section of the Army Medical Museum and Library, and in connection with national collections covering every branch of medicine and surgery.

The active interest of the profession has not been commensurate with its opportunity, nor with the interest and expenditures of the officers in charge of this National Medical Museum and Library. Only one of the handsome cases built especially for the dental section of the museum contains specimens, and more than half of these were purchased at an expense of $1200 or $1500. The empty shelves are the measure of the difference between contributions promised and donations received, while they bear silent but impressive evidence to one hundred thousand visitors annually of your failure to make this section illustrate the past history and present condition of the science and art of dentistry. We append a recent letter from Dr. Dallas Bache, Assistant Surgeon-General, whose candid statement betrays disappointment.

Reference to the list of contributions will show that the specimens so far received are not generally of a kind that would enhance an observer's estimate of the attainments of the dental profession in matters pathological, surgical, etc. There is not in the collection a single case illustrated by model, photograph, or otherwise of the

surgical treatment of a congenital defect, of a disease, of a deformity, or an injury of the mouth, jaws, or teeth, though the literature of the profession abounds in such cases.

Are you personally and individually willing to remain inactive while the attainments of your profession are estimated daily from a partial and inadequate collection?

We commend the work done for the museum by the *Items of Interest*. No other effort has been so well directed and fruitful.

The building up of the library is, fortunately, capable of being carried on independently of the help of the profession, and there is therefore a much more creditable collection of books and pamphlets, containing almost every dental publication of which there is present knowledge.

While this institution depends mainly on purchases, contributions, especially by authors, are welcomed. We ask your attention to the appended list of journals and society transactions needed to complete the library files. Each State society mentioned in the list should supply its transactions or give Dr. Merrill the information he asks.

Your committee has been greatly disappointed in the failure of Congress to appropriate for a dental pathologist, as recommended by the Surgeon-General.

While liberally appropriating for experts in various medical subjects, and thus contributing to the scientific advancement of general medicine and surgery, not a single dentist is employed as a dentist or an expert in dental subjects in any department of the Government.

The conditions growing out of the war with Spain have prevented due consideration of our claims by the Appropriations Committee of the Senate and House, though the Senate has twice included in its appropriations an item of $2000 a year for a dental pathologist for the Army Medical Museum. We are indebted to the influence of Dr. Kirk and some of his University of Pennsylvania friends for the second action of the Senate.

We hope to secure the appropriation next winter.

Respectfully submitted,

Wms. Donnally,
Henry W. Morgan,
John S. Marshall,
Committee.

War Department,
Surgeon-General's Office,
U. S. Army Medical Museum and Library,
Cor. 7th and B streets, S. W.,
Washington, July 22, 1899.

Dr. Williams Donnally, Chairman, etc., 1022 14th st., N. W., Washington, D. C.

Dear Sir,—In compliance with your recent oral request, I inclose a condensed list of purchases and contributions to the dental collection in this Museum for the last three years. So far, the enlargement of this section has been slow, and chiefly by purchase, but I have no doubt that when the attention of your Association is called to the value of a distinctly illustrative group of this kind, permanently preserved, and for a clear purpose, an interest which has been fragmentary and remotely aroused will be usefully quickened.

The magazine, *Items of Interest,* has recorded many of these contributions, and we wish to thank the gentlemen in charge of that department. The donations have been specially acknowledged.

It so often happens that curators of museums, and librarians, are told that notable collections of specimens and books are destined to their ultimate care as legacies, or when something more or less definite happens, that perhaps it is permissible to say that we much prefer to entertain the living donor, and show him where his treasures are kept.

Very respectfully, Dallas Bache,
Col. and Asst. Surgeon-General, U. S. A., in charge of Museum and Library Division.

Dental Specimens contributed to the Army Medical Museum during the Last Three Years.

Dr. M. F. Finley, 18 teeth, showing anomalies and diseases, contributed at various times; 4 plaster casts of upper dentures; right lower alveolar process; pulp-stones from teeth; incisor tooth with caries of crown; 2 bony spiculæ removed from gum over third molars.

Dr. J. L. Wolf, plaster cast of upper denture.

Dr. Murray Acklin, teeth fillings and plate.

Dr. E. C. Ridgell, 8 teeth showing diseases.

Dr. E. L. Jones, 6 teeth showing anomalies and diseases.

Dr. E. M. Murlless, supernumerary tooth; 9 teeth showing diseases or anomalies.

Dr. Louis A. Walz, plaster cast of upper denture.

Dr. M. E. Le Galley, plaster casts of three sets of dentures.

Dr. V. H. Jackson, 7 plaster casts of dentures.

Dr. C. C. Stanley, a series of 11 teeth showing anomalies.

Dr. J. Spyer, 2 plaster casts of dentures; 1 incisor.

Dr. C. Klein, 6 teeth showing anomalies.

Dr. W. Cureton, supernumerary bicuspid.

Dr. H. H. Way, 8 teeth showing anomalies; improvised substitute for loss of lower incisor; 2 models of upper dentures.

Dr. J. F. Galentine, 4 teeth showing anomalies; 1 supernumerary tooth.

Mr. M. S. Towner, molar and incisors.

Dr. Louis E. Barnard, set of dental instruments.

Dr. T. B. Hyatt, first dental engine patented in England.

Dr. J. S. Hulbert, plaster cast of anterior portion of upper jaw.

Dr. W. H. Brown, plaster cast of palate.

Dr. E. C. Sloan, upper maxillary and portion of malar and palate bones.

Dr. H. T. Mansfield, tooth of sperm whale; root reducer for dental engine; double molds of upper and lower dentures; 2 plaster casts of dentures.

Dr. C. T. Daniel, 48 teeth showing anomalies or diseases, contributed at various times.

Dr. W. A. Spring, 2 plaster casts of deformed jaws.

Dr. H. Van Antwerp, plaster cast of upper denture.

Mrs. H. P. Sheffield, series of teeth showing lesions.

Dr. Williams Donnally, 22 teeth showing anomalies and diseases, contributed at various times; key for extracting teeth; gavel used by the American Dental Association; plaster casts showing shape of maxillary sinus; portion of left face, including maxilla; 3 plaster casts.

Dr. J. A. Robinson, parts of upper and lower dentures, artificial; 3 teeth showing caries and malformation.

Dr. Ch. Nevitte Gibbons, plaster cast of denture with model of apparatus.

Dr. C. H. Haines, supernumerary tooth.

Dr. P. S. Hitchcock, 3 busts of dentists, A. P. Southwick, T. W. Evans, J. Greenwood; 3 upper dentures carved out of bone, horn, and wood; plaster cast of upper denture.

Dr. J. G. Crockett, tooth malformation and caries.

Dental Specimens purchased for the Army Medical Museum during the Past Three Years.

Ward's Natural Science Establishment, 20 skulls showing normal and pathological condition of teeth; 10 skulls showing vertical sections of teeth; a series of 74 specimens showing anomalies and diseases of teeth.

Dr. J. H. Emerton, model of upper and lower dentures, 12 times enlarged.

Kny-Scheerer Co., skull with accessory tooth; 3 skulls showing dentition.

Dr. V. H. Jackson, a series of 169 plaster casts of teeth showing malposition and the methods and appliances used in their correction.

Dental Journals Wanted.

The following list of American dental journals needed to complete the Library of the Surgeon-General's Office is published in the hope that members of the dental profession will assist in making it a national dental library, as it is now a national medical library, the recent action of the National Dental Association in recognizing it as such having placed the matter directly before them.

As years pass it becomes more and more difficult to obtain complete files of these journals; many are stored away in attics and cellars to be finally used for fires or sold as old paper, and, as a rule, they are rarely for sale by dealers in second-hand books.

The library contains a fair general collection of dental literature of this and other countries, and takes forty-six current dental journals,—all that are known to be published at the present time. Important gaps exist, as indicated in the following list, and it is especially important that these should be filled as soon as possible. A list of dental transactions and proceedings likewise needed is also appended. Many of the older works on dentistry, of each edition, are also desired, as well as complete series of the annual catalogues and announcements of dental colleges, and correspondence in regard to such is invited.

If necessary, journals and books will be purchased, but the appropriation for the support of the library being limited, it is hoped to obtain most by contribution, using the money for subscriptions to the current journals and such new works as may not be presented to the collection by the authors, as many are.

A large number of duplicate medical works and a few on dentistry are available for exchange, and, upon notification, franks will be sent by which donations may be mailed to the library without expense:

Albany Dental Journal. Want all or any part.

American Dental Review. By A. M. Leslie, Quarterly, St. Louis. Want all after No. 1, Vol. IV (January, 1863).

Cincinnati Dental Lamp. By J. M. Brown, Quarterly. Want all except Nos. 3, 4, Vol. I (1860).

Dental Circular and Examiner. By B. Wood, Quarterly, Albany. Want all after No. 3, Vol. I (July, 1865).

Dental Enterprise. By H. Snowden, Monthly, Baltimore (1860 or earlier). Want all or any part.

Dental (The) Headlight. Quarterly, fol., Nashville, Herman & Morrison Bros. Want No. 3, Vol. I (July, 1880).

Dental Instructor. By E. A. L. Roberts, Quarterly, 8vo, New York. Want all except Nos. 1, 2, Vol. I (1860), and No. 1, Vol. II (January, 1861).

Dental (The) Jairus. By W. O. Thrailkill, Monthly, 8vo, Sacramento, Cal. Want Nos. 4 *et seq.*, Vol. IV (1883), and all after March, 1884.

Dental Mirror. By C. Walker, Northampton, Mass. Want all after No. 1 (June, 1843).

Dental Monitor. By J. G. Ambler. Want all after February, 1855.

Dental (The) News. By T. P. Wagoner, Monthly, fol., Knightstown, Ind. Want No. 3, Vol. II (July, 1879); No. 8, Vol. V. (December, 1882).

Dental News Letter. By J. D. White and J. R. McCurdy, Quarterly, Philadelphia. Want No. 1, Vol. I (October, 1847).

Dental Office and Laboratory. (Johnson & Lund, publishers.) Monthly, Philadelphia. Want No. 3, Vol. I (May, 1868).

Dental Times and Advertiser. By A. A. Blandy, Quarterly, Baltimore. Want title-page and index of Vol. I (1851-52), and all after Vol. I.

Family Dental Journal. By D. C. Estes, Albany, N. Y., 8vo. Want all except No. 3, Vol. I (January, 1854).

Items of Interest, Vineland, N. J. Want Nos. 1, 5, Vol. I; Nos. 1, 4, 6, Vol. II; Nos. 1, 2, 6-10, Vol. III; Nos. 3-6, 8-12, Vol. IV.

New York Dental Recorder. By J. S. Ware, Monthly. Want No. 9, Vol. VI (1851-52).

Roberts and Houghton's (Drs.) Dental Annual. 8vo, Poughkeepsie, N. Y. Want all except No. 1, Vol. II, and No. 1, Vol. III (1868-69).

Saint Louis Dental Journal. By J. Paine, Monthly. Want all after No. 2, Vol. I (April, 1868).

St. Louis Dental Quarterly. By C. W. Spalding and H. S. Chase, 8vo, St. Louis, Mo. Want all after No. 3, Vol. I (July, 1878).

Stockton's Dental Intelligencer. Monthly, Philadelphia. Continued as *Dental Intelligencer and Record,* etc. Want Vol. I (1844-45).

Texas Dental Journal, Dallas. Want Vols. I-VI (all prior to 1889).

Vicksburg New Era. By W. S. Young, Monthly. Want all except No. 11, Vol. I (July, 1869).

Vulcanite. By B. W. Franklin, Quarterly, New York. Want all after No. 1, Vol. III (May, 1862).

Publications Wanted.

Alabama Dental Association. Want all publications.

American Dental Association, Transactions. Want 1863.

California State Dental Association, Transactions. Want fifth, 1874; eleventh, 1880, and all subsequent.

Central Dental Association of Northern New Jersey. Want all publications.

Central Illinois Dental Society. Want all publications.

Central Pennsylvania Dental Association. Want all publications.

Chicago Dental Society. Want all publications.

Cincinnati Dental Society. Want all publications.

Delaware State Dental Society. Want all publications.

Dental Society of the State of Maryland and the District of Columbia, Proceedings. Want all except first annual session, 1875.

Dentist Mutual Benefit Association. Want all publications.

Harris Dental Association. Want all publications.

Illinois State Dental Society, Annual Journal of. Want fifteenth, 1879.

Iowa State Dental Society, Transactions. Want all except joint session, 1873, and eighteenth, 1880.

Kansas City Dental Society. Want all publications.

Kansas State Dental Association, Transactions. Want first, 1872; sixth to ninth, 1877-80; twelfth, 1883, and subsequent.

Kentucky State Dental Association. Want all publications.

Lake Erie Dental Association. Want all publications.

Lebanon Valley Dental Association. Want all publications.

Louisiana State Dental Society. Want all publications.

Michigan Dental Association, Transactions. Want first to twenty-first; twenty-third, 1878; twenty-seventh, 1882, and subsequent.

Minnesota Dental Association. Want all publications.

Mississippi Valley Association of Dental Surgeons, Proceedings. Want all except first annual meeting, 1845.

Nashville Dental Association. Want all publications.

National Dental Association. Want all publications.

Nebraska State Dental Society. Want all publications.

New Jersey State Dental Society, Proceedings. Want all prior to 1870; 1889, and subsequent.

New Orleans Odontological Society. Want all publications.

New York Odontological Society, Transactions. Want all prior to 1875; 1878, 1884, 1888, and subsequent.

North Carolina State Dental Society. Want all publications.

Northern Ohio Dental Association. Want all publications.

Northwestern Dental Association. Want all publications.

Odontographic Society of Pennsylvania. Want all publications except Vol. I, for 1864.

Ohio Dental College Association. Want all publications.

Ohio State Dental Society, Transactions. Want first to ninth (all prior to 1875); nineteenth, 1884, and subsequent.

Oregon State Dental Society. Want all publications.

Pennsylvania State Dental Society, Transactions. Want seventh annual meeting, 1875; also, 1884, 1885, 1887, 1893, and subsequent.

Pittsburg Dental Society. Want all publications.

Rochester Dental Club. Want all publications.

Seventh District Dental Society of New York. Want all publications.

Sixth District Dental Society of New York. Want all publications.

Southern Dental Association, Transactions. Want all except third meeting, 1871.

Tennessee Dental Association. Want all publications.

Texas State Dental Association. Want all publications.

Third District Dental Society of New York. Want all publications.

Virginia State Dental Association. Want all publications.

Wisconsin State Dental Society, Proceedings. Want all except for year 1871.

It is probable that several of the State societies here mentioned have published no proceedings other than in the current dental journals. Definite information about such cases is much desired.

J. C. Merrill,
Major and Surgeon, U. S. Army Librarian, S. G. O.

Report on Necrology.

By some oversight the death of Dr. R. Finley Hunt was not reported at Omaha last year.

Dr. R. Finley Hunt was born in Athens, Ga., and was educated as a civil engineer; studied dentistry with Dr. J. D. White, of Philadelphia; began the practice of dentistry in Washington, D. C., in 1841 or 1842, where he was in active practice for over fifty years. Was elected and served several years as city surveyor. Was one of the organizers of the Washington City Dental Society, and its first President; a member of the American and Southern Dental Associations; an active worker in all of these societies. It was largely through his efforts that the sections were organized. He took an active part in the union of the American and Southern Dental Associations. He was a member of the committee on the history of the dental profession. He died May 22, 1898, at Washington, D. C., in his eighty-first year.

J. Taft,
Jas. McManus,
H. B. Noble,
Committee.

Annual Address.

By H. J. BURKHART, President.

IT is my pleasant privilege to welcome here to-day this vast assemblage of representatives of the profession from this country and the distinguished gentlemen from abroad, who have, at no little sacrifice, come here to show by their presence that they are loyal to and interested in the work of this Association. It is a happy augury to have such a large and representative gathering as this, and I congratulate you all upon the evidence on every hand of the cordial feeling which should exist in any profession organized for mutual improvement and the welfare of humanity. On behalf of the National Dental Association I take great pleasure in extending to you all a most hearty welcome and a cordial invitation to participate in the deliberations of the meeting.

I shall endeavor in as brief and concise a manner as possible to present for your consideration the various questions of importance which you will be called upon to decide this year. It is not my intention to anticipate the report of any committee or to draw invidious comparisons. My opinions are offered only after careful reflection and with a sincere desire for the advancement of this Association.

International Congress, 1900.

A committee was appointed last year to devise measures for the proper representation of the profession in this country at the International Congress in Paris in 1900. The chairman of that committee will make a full report later, and I trust that the recommendations he may make will receive your indorsement and approval, so that our French brethren may again have evidence of the high regard in which they are held by us, and also, in a small way, to

repay them for the interest they manifested in the Columbian Dental Congress. It is hoped that the date of the next annual meeting of this Association can be arranged so that it will not conflict with this Congress and give the profession in this country an opportunity to demonstrate to the world that the American dentist intends to remain in the front rank.

Army Medical Museum and Library.

Your attention is invited to the report of the Committee on Army Medical Museum and Library. The labors of this committee have been arduous, and the work which belongs to the many has, as usual, fallen upon the few. It is a matter for sincere regret that so little interest is taken in this worthy institution, which I construe as being due more to carelessness than lack of appreciation. I appeal to the whole profession to aid in bringing together the countless number of valuable specimens now scattered about the country, and to assist the committee in their laudable efforts to bring this department up to a high standard of usefulness.

Committee on History.

I cordially indorse the report of the Committee on History, and ask you to co-operate with it in the laborious task of gathering material for an interesting and reliable history of the profession.

Membership.

An inspection of the roster of this Association will reveal the fact that scores of prominent members of the profession do not hold membership here. This is a condition which should not exist, and every effort should be made to so formulate the rules that no worthy practitioner will be excluded. The by-laws should be amended so that any clean, honest, ethical dentist may gain membership here. Instead of a mere handful, there should be a membership roll of at least several thousand. The requirements at present are of such a restrictive character, and the method of electing so unsatisfactory and cumbersome, that there should be no hesitation in a radical departure. The meetings of the State societies are scattered throughout the year, and when the main body convenes at some distant point little or no interest is taken in electing delegates who intend to complete membership. The clause denying membership to those without a degree who have entered the profession since

1875 is absurd, because a man with no degree is, in most instances, quite as well qualified to sit here as one who received his D.D.S. *in absentia* prior to that time, and there is no good reason why the time limit should be placed as far back as 1875. It would be "a consummation devoutly to be wished" if none could be elected until after "some meritorious work" had been done; but, unfortunately, no standard has been adopted, and until one is agreed upon or a permanent board of arbitration appointed that clause should be eliminated.

I recommend the adoption of the following amendment: Article III, Section 3, to read as follows: "All delegate members shall be practitioners of dentistry. They shall be received from permanently organized dental societies working under the code of ethics of the National Dental Association, elected by ballot at some regular meeting of their society, and in the event of charges being filed against an applicant for membership the committee on credentials shall have full power to examine and pass upon the same." I also recommend the repeal of Sections 1 and 4, Article IV.

The adoption of this amendment will provide an easy way of quickly increasing our membership and bring in many desirable men. It would be ridiculous to say that the New York Odontological Society, the Chicago Dental Society, and many similar organizations of a like local character are not equal to, and in many instances superior to, some State societies, and, that fact being admitted, no good reason exists for denying them the privilege of membership here. The qualifications for membership should be made broad and liberal, and an effort made to efface the impression that this national body is a close corporation or a sort of dental trust. The burden which has been borne by a few should be shifted to the backs of the many, and that can only be done by wiping out moss-covered rules and keeping in touch with the spirit of the times, so that this shall become a great, popular, and industrious organization.

Sections.

The efficiency of the sectional plan of work has been much discussed, and a glance at the program for this meeting will make it plain to any one that there are busy times ahead for each Section. A number of prominent essayists have voluntarily informed me that if Section meetings are well attended and a full and proper discussion of the papers obtained they will waive the privilege of

presenting their work before the main body, and in that way materially assist in disposing of the entire program. It should be understood that after a paper has been presented to a Section the essayist has not the right to withdraw it except with the consent of the Section; that no paper shall be considered which has been previously read before any other society, and that every paper is the property of the Section unless otherwise stipulated at the time of presentation.

It seems to me that Sections should be consolidated and the number materially reduced, which would eliminate no little amount of friction. Section work for the next annual meeting should be planned here, and a business committee appointed which shall have general supervision of all papers presented, so that they may be referred to the Sections to which they properly belong.

Publication of Transactions.

From time immemorial the publication of the Transactions has been an endless source of annoyance to the officers and Publication Committee, and much time has been consumed in an effort to place the responsibility for the non-appearance of this troublesome volume upon any but the guilty parties. The publishers have not always been at fault. In many instances much delay has ensued by a division of responsibility, procrastination, and indolence of those to whom proofs have been sent for correction and revision. Proceedings of societies to be of any value should be ready for distribution within three months after the close of a meeting. I recommend that the Secretary be authorized to make a contract for the printing of the proceedings of this meeting on or before November 1 of this year, and that the publishers shall be required to give a sufficient bond to insure the fulfillment of the contract; and, further, that the Publication Committee be instructed and given full power, where members do not return corrected proof sheets promptly, to eliminate such matter entirely or only publish that which they deem proper. This suggestion may appear drastic, but some heroic measure is necessary to correct this time-honored abuse and distressingly unbusiness-like procedure.

Committee on Journal.

A committee has been in existence some years to take into consideration the desirability of establishing a journal. I have been

unable to discover any real sentiment in favor of a new publication, because those in existence now are of such a high character and offer such excellent facilities for publishing and illustrating papers that it would not seem to be the part of wisdom to launch an enterprise of this nature, which would necessitate the expenditure of a large sum of money and quite likely prove to be an annoying and vexatious undertaking. It may be shocking to the fine feelings of extreme advocates of independence in journalism to be obliged to live in this practical age, but before their ideal can be realized they should be made to understand that it would be more consistent to support those which we have now, and to be more punctual in attending and contributing to the success of society meetings. The only enthusiasm for an independent journal that I have seen was at some dental dinner—after the walnuts and wine.

Executive Council.

The proposition to vest authority in an Executive Council and eliminate all business matters from the sessions of the main body should receive your careful consideration. There is no doubt that much valuable time is often frittered away in debating questions of a trifling nature.

The Committee on Revision of the By-Laws appointed by the American Dental Association in 1891 reported a set of rules which, with slight modifications, would be a great improvement and have a tendency to expedite the transaction of business. The salient feature of that report was vesting power in an Executive Council to call meetings of the Association in the afternoon (when this body is usually not in session) for the disposal of all routine business, amendments to the by-laws, election of officers, and time and place of next meeting. It will be observed that this plan would take from the Association no power which it now has, and every member would have a voice in determining questions of business and society policy precisely as at present, with the advantage of previous notice that all general matters would be disposed of at a particular session. (The chair is diametrically opposed to the proposition of allowing a committee to elect officers, decide upon time and place of meeting, or amendments to the by-laws.) One short session will be sufficient to decide questions of so much importance to the whole membership. A fair trial can do no harm, and I recommend the adoption of the proposed amendment.

Discussion of Papers.

I also recommend the adoption of a rule limiting the time for discussion of papers which come before the general meeting as follows: Ten minutes for opening and five minutes for general discussion. It has been the custom of many gentlemen to assume that in order to clearly state their positions it is necessary to go into the minutiæ of every phase of a question, and recall step by step the history and progress of events well known to the average dentist. The long, dreary, tiresome, and irrelevant debate so often encountered at meetings of any considerable size detracts in a large measure from their usefulness. Any man with clear and well-defined ideas should be able to properly express himself in five minutes. There probably would never be the slightest difficulty in obtaining unanimous consent for extra time should the contingency arise. The tendency of many to occupy so much time in defense of fancied reflections of a more or less personal nature (of no interest to any one but themselves) and the reiteration of pet theories and doubtful modes of practice should be severely condemned, and the chair vested with full power to promptly curtail unnecessary debate.

Scientific Bureau.

Various suggestions have been advanced for the raising of funds and the establishment of a permanent bureau having for its purpose the encouragement of original investigation, but, as with many other good things, there has been an interminable amount of talk, with the usual result of nothing done. It is a well-known fact that the large majority of men in the dental profession who have done original work are poor, and as they have given freely of their knowledge and every one has profited by their discoveries, it is but fair—if we intend to be known as honest men—to inaugurate some movement which in the future will properly and adequately support those who are willing to engage in scientific work. At present there is little incentive and meager facility for young men to engage in this work after graduation. The necessarily expensive paraphernalia required is beyond the reach of many, so some plan should be devised by this body to provide a proper mode of procedure. The National Association should take upon itself this important work, and if a competent bureau is established here there will be little difficulty in obtaining financial assistance from other societies. The

first essential is a well-appointed, energetic, and competent section, and I recommend the appointment of a committee of three to report at this meeting and suggest ways and means for establishing a bureau of such nature.

Indorsement of Proprietary Preparations.

With the discovery of any new, or the resurrection of any old, germicide it has been the custom for various manufacturers to place upon the market countless numbers of deliciously perfumed and pleasant tasting preparations designed to destroy every known form of bacteria in the twinkling of an eye, and they have religiously asked the dental profession to resolve itself into a respectable advertising agency. Attractively labeled sample bottles, promises of great financial returns from stock dividends, aided by suave manners and smooth tongues, have usually been sufficient to enlist the aid of gentlemen who have always considered themselves strictly ethical. It seems incredible that professional men can be found who will indorse formulas of which they know nothing and preparations of which they have no control, and recommend the same to patients knowing that they are to be enriched by a large sale of the article. I commend the ethical side of this matter to the thoughtful consideration of erring brethren. It is time a halt was called and a stinging rebuke administered to those who go about the country boasting that dentists are easy marks and ready prey for dealers in green goods and venders of gold bricks.

Revision of Code.

Serious consideration should be given to the report of the Committee on Revision of the Code, and stringent measures adopted to check the tendency to unethical conduct which has been so strikingly apparent of late, and this Association should insist that every member connected with it conduct himself in a respectable professional manner. A high order of ethical conduct should be observed by those connected with colleges, so that infirmary abuses may be corrected and young men made to understand that the path of honor lies not in the perpetuation of quackery, but in the good opinion of clean, honest, reputable practitioners. The shallow excuses so often advanced to condone infractions of the code should receive no consideration, because its provisions are plain and easy of interpretation by any right-minded individual. The honor and good name

of the profession are at stake, and this National Association must demand of its members a strict observance of the spirit and letter of the Code.

Army and Navy, Unification, Life Insurance, Etc.

It is not from a pessimistic or chiding spirit that I direct your attention to a number of questions that have been under discussion in dental societies for a decade or more which are no nearer solution to-day than when first presented. Much valuable time has been consumed in their consideration, and practically nothing has been accomplished. The time seems ripe for energetic concerted action to secure the appointment of dentists in the army and navy, unification of State laws, dental examination for life insurance, the education of the public in oral hygiene, and the insistence upon a higher preliminary standard for matriculation in dental schools.

It is not necessary for me to present arguments to show the necessity for appointing dentists in the army and navy. The most essential point to be determined is whether or not the dental profession knows its own mind, and, if it does, to agree upon some measure which can be presented to Congress as representing the best thought and sentiment of the profession on this important subject. I therefore recommend that the Committee on Dentists in the Army and Navy be instructed to prepare a bill and report at some session to-morrow, and then let there be appointed a large, energetic, and representative committee, free from dead wood and drones, to assist the local members at Washington in bringing the matter to a successful issue. The time is propitious for securing affirmative action at the next session of Congress. The abundance of evidence that can be produced of the inefficiency of the army and navy medical bureaus during the late war, and the unnecessary suffering of our soldiers and sailors for lack of proper dental attention, will prove a powerful argument in securing necessary legislation. It is a great national crime to deny relief to and refuse to alleviate the sufferings of those who risk their lives in defence of the flag. Well-directed and united action by the dental profession, together with the powerful influence of public sentiment, will surely accomplish the desired result.

The desirability of a unification of the State laws is apparent to any observer. Much time has been wasted in an attempt to show

that most State laws were not in accordance with the Constitution, because the liberty of the individual was restricted. The United States Supreme Court has affirmed the validity of the New York State medical law, and declared that the States under the police power granted by the Federal Constitution have the right to control their own affairs in framing laws to protect the health of the people. While it may not be possible to secure the same high standard in every State at once, it is a fact that there are at present three States which do have an interchange of licenses, and who stand ready to indorse licenses from any other State adopting their standard. The onward march has commenced, and I venture the prediction that with proper assistance from this Association the day is not far distant when a license granted in one State will be made the passport for practice not only on this continent, but all over the world.

Life insurance companies and the various educational authorities should be made to feel the necessity for proper care of the teeth in order to conserve the health of the individual. Capable and industrious committees should be appointed to consider these questions and report—not a year or five years from now, but at this meeting—some proper and feasible method for attaining the desired result.

Preliminary Standard for Matriculation.

I approach the subject of exacting a higher preliminary standard for matriculation with some hesitation, well knowing the difference of opinion which exists on this question; but it seems to me that the influence of the members of this Association should be used in an effort to retain that which has already been accomplished and aid in every proper way a further advance of the preliminary requirement. Abundant evidence is at hand to show the necessity for demanding a higher mental equipment for those intending to practice dentistry, and the public records of the examinations in States with an advanced requirement amply prove the wisdom of the laws now in force. The striking difference in the character of the papers examined in the State of New York during the past year and those of a few years ago is sufficient evidence that a high preliminary educational standard should be maintained. It is well known that the educational machinery of the several States is not the same, and that it would be impossible to at once exact the standard in force in

this State in every other; but with steady, persistent effort on the part of educational authorities other sections of the country will soon see the wisdom of an advance along this line. Weak colleges should be consolidated, and every facility offered to increase the efficiency of the schools.

This is not the time to take hasty or ill-advised steps, because no great reform was ever carried to a successful issue in a day. The spirit of harmony and forbearance should always be maintained in considering questions of vital importance to the whole profession. Each national body should attend strictly to its own affairs, and endeavor by an interchange of ideas to finally and harmoniously reach the desired goal. With the elimination of petty jealousies and the desire for personal power and gain all discordant elements can be removed. Bogus reformers, cranks, and mercenary individuals should be sent to the rear and strenuous efforts made to find a common ground for all divergent elements to stand upon, and this can be accomplished by a spirit of conciliation, which should always be observed in considering questions which affect interests of such a vital nature. No one man can claim title to all the honesty and intelligence, or consider himself the absolute dictator of matters pertaining to the welfare of the whole profession. Too close connection with college or examining board work and the seclusion of an editorial sanctum are liable to warp the opinions of many well-meaning men; and, while their views should receive careful attention, it must not be forgotten that the large army of lay members of the profession is entitled to consideration, and that no question is rightly settled which does not deal fairly with every interest. I am sure I express the hope of every well-wisher of the profession that all discordant elements may soon be brought into complete harmony.

There is an element abroad in the land that considers itself competent to pass judgment upon dental matters of every conceivable shape and form, and to criticise society meetings and societies in general for not approaching their narrow ideal. It usually comes from men who are not members, and who do not even take the trouble of attending a meeting. This was notably true of the old American Association, and no society ever suffered more by this sort of unfair and unjust criticism. Even to-day we hear calumnies uttered about it which should bring the blush of shame to the cheeks

of those who must know their opinions are warped by grievances of a personal nature. That there are objectionable features in every system or organization cannot be denied, but that is not a sufficient reason for withholding support. While honest criticism is always invited, that of a captious nature should be avoided. Let no man condemn without first making an effort to correct existing errors. There is need for a great national dental organization, and it is the duty of every member of the profession to heartily and loyally support this Association. With a few necessary changes it can be made a powerful instrument for good and materially assist in advancing the interests of the whole profession. It should be made the forum for a free and fair discussion of all questions, and no narrow soul should find an abiding-place therein. Patriotism and loyalty to dental organizations should be instilled into the hearts of all young men. The doubts and fears expressed for the permanency of this organization have not been realized, and if I am able to correctly interpret the signs of the times the faint-hearted need be troubled no longer. Absolute harmony prevails everywhere, and the day is not far distant when croakers will seek membership elsewhere. With an earnest effort the highest ideal will soon be reached, and no man, be his attainments ever so brilliant, need be ashamed or humiliated by owning allegiance to the National Dental Association.

We meet to-day on historic ground. Forty years ago a little company gathered here to lay the foundation for a national organization. Many of those in attendance at that first meeting have long since passed to their reward, and it remains for us to keep their memory green by diligently and faithfully striving for the elevation of the profession which they loved so much and for which they made so many sacrifices. In this age of hurry and excitement too little attention is devoted to the trials and discouragements which were met on every hand by the pioneers of the profession. The difficulties surmounted, the ability and devotion displayed, and the matchless loyalty manifested for a struggling profession should always remain as a proud heritage to coming generations. With sagacity of a high order, prudence, and an intense devotion, dentistry was placed upon a safe and enduring foundation. A cursory glance in retrospection only is necessary to bring out in bold relief the meager facilities for gaining and imparting knowledge then exist-

ing, and it is a source of constant wonder that dentistry was finally elevated to the dignity of a profession. The wonderful progress of our calling during the closing years of the century is as marvelous as it has been great, and were I endowed with prophetic vision I should have little hesitation in predicting that the achievements of the past are nothing compared with what the future has in store. Education and progress go hand in hand. Then let us improve the opportunities of the present, laboring steadfastly and unceasingly to reach the highest ideal of professional development.

Report of Committee on President's Address.

THE Committee on President's Address beg leave to make the following report:

We heartily indorse the President's reference to the work of the Committee on the Army Medical Museum and Library, which is our national collection of specimens and literature.

Membership.

We recommend that the changes suggested by the President in reference to obtaining membership in this Association be referred to the Committee on Revision of the Constitution.

Sections.

Your committee, following the suggestion of the President to consolidate the Sections, recommends that the Sections be changed to read as follows:

Section 1. Prosthetic Dentistry (including Crown- and Bridge-work), Chemistry, Metallurgy, and Orthodontia.

Section 2. Dental Education, Literature, Nomenclature, Histology and Microscopy.

Section 3. Operative Dentistry, Materia Medica and Therapeutics.

Section 4. Physiology, Etiology, Hygiene, and Prophylaxis.

Section 5. Anatomy, Pathology, and Surgery.

Section 6. Clinics.

This also properly comes before the Committee on Revision of the Constitution.

Publication of Transactions.

With reference to the publication of the transactions of this body, we would suggest that a time-limit of fifteen days, from date of mailing, be allowed for correction and return of proof-sheets by the

members. On failure of any member to return said proof-sheets, duly corrected, within the time-limit that the Publication Committee be given full power to either eliminate such matter entirely or publish such parts of said matter as they may deem proper.

Committee on Journal.

We recommend that this committee be relieved of further duty and given the thanks of the Association.

Ownership of Papers.

See Article IX, Section 5, of the Constitution and By-Laws. This covers the question, and vests the right of ownership in this Association.

Executive Council.

This subject has been reported by a special committee, which report is now under consideration by this Association.

Discussion of Papers.

We indorse the President's suggestion to reduce the time-limit, and recommend that ten minutes be allowed for opening and five minutes to each member for discussion.

Scientific Bureau.

Your committee would indorse the suggestion of the President that a scientific bureau be established, and that he appoint a committee of three, to report at this meeting, to suggest ways and means of establishing such a bureau.

Indorsement of Proprietary Preparations.

The committee believe that this is fully covered by the Code of Ethics, when it distinctly states that it is unprofessional to indorse nostrums.

Revision of the Code.

Your committee heartily indorses the President's reference to the revision of the code, and asks for the serious consideration of this matter when the report is presented by the special committee.

Army and Navy.

We recommend the appointment of a committee at large to act in accord with the present one (on the appointment of dentists in the army and navy); said committee to consist of one member of this Association from each State, and it shall be their duty to urge

upon their Congressmen and Senators the importance of dentists in the army and navy.

In reference to the report of Drs. Donnally and Finley, we do not entirely agree with them, "that we should work for status only," but recommend that this Association work for the admission of dentists into the army and navy and then for their status.

We think that the above covers the report of Drs. Donnally and Finley, and recommend that they be thanked for their past services and be continued on this committee.

It has been suggested to your committee that the National Dental Association make an appropriation to defray the expenses of the active members of this committee.

Unification of Dental Laws.

Unification is greatly desired. Failing in this, we should work to the end that one examination by a State Dental Board should entitle a dentist to practice in all the States in the Union.

We also recommend that a committtee, composed of one man from each State, be appointed to further such unification.

Life Insurance Examination, etc.

We recommend that the President, at his discretion, appoint a committee in reference to life insurance examination and the enlightenment on dental subjects of the various educational institutions.

We heartily indorse the elevating sentiments expressed in the closing paragraphs of the President's most estimable address.

Respectfully submitted,

Jas. McManus, *Chairman;*
Thos. P. Hinman, *Secretary;*
L. G. Noel.

SECTION II.

Dental Education, Literature, and Nomenclature.

REPORT BY S. H. GUILFORD, CHAIRMAN.

YOUR Committee, in offering its annual report, begs leave to call attention to the number of valuable works relating to dental science which have been published in America during the past year, as shown in the following list: "Anatomy and Histology of the Mouth and Teeth," by I. N. Broomell, D.D.S.; "Comparative Dental Anatomy," by A. H. Thompson, D.D.S.; "Chemistry and Metallurgy as Applied to Dentistry," by Vernon J. Hall, Ph.D.; "The Practice of Dental Medicine," by Geo. F. Eames, M.D., D.D.S.; "Interstitial Gingivitis, or so-called Pyorrhea Alveolaris," by E. S. Talbot, M.D., D.D.S.; "Cataphoresis, or Electric Medicamental Diffusion," by W. J. Morton, M.D.; "Methods of Filling Teeth," by R. Ottolengui, M.D.S. (second edition); "Dictionary of Dental Science," by F. J. S. Gorgas, M.D., D.D.S. (sixth edition); "Dental Medicine, or a Manual of Dental Materia Medica and Therapeutics," by the same author (sixth edition).

Dental periodical literature has neither advanced nor declined during the past year, if measured by the number of publications issued. *The Dental Practitioner and Advertiser* has been discontinued after a useful existence of twenty-nine years, while the *American Dental Weekly* closed its career at the end of the first year.

The new periodicals of the year are *The American Dentist at Home and Abroad* (monthly), edited by Chas. R. Hambly, D.D.S., and *Information* (monthly), edited by L. P. Bethel, D.D.S.

Dental journalism has been enriched during the past year, probably more liberally than in any preceding year, by the contributions of our best writers, thinkers, and workers. In the line of histo-

logical research it may not be amiss to mention the labors of Dr. J. Leon Williams and Professors Broomell and Cryer; in artistic development in the practical line the work of Dr. N. S. Jenkins is to be commended, while in the clear presentation of methods in operative procedure the articles of Professor C. N. Johnson are worthy of all praise.

Dental education has shown its usual advancement. In accordance with the rule of the National Association of Dental Faculties, the requirements for college entrance during the year just passed have equaled the completion of a grammar school course, while those for the coming year will be the equivalent of one year's high school study. The entrance requirements, as well as those for graduation, will steadily increase as rapidly and to the extent of the best wisdom of those having our educational interests in charge.

For several years a degree of tension has existed between the National Association of Dental Examiners and the National Association of Dental Faculties, but it is our pleasure to report that within the past twenty-four hours all differences have been adjusted and perfect harmony between the two bodies restored. It is hoped and confidently believed that as a result of this agreement the interests of dental education will be materially and permanently advanced.

The number of schools which are at present members of the National Association of Dental Faculties is forty-six, while the number outside of its jurisdiction is probably less than a half-dozen.

Section II has carefully examined the papers presented for approval under its general head of Dental Education, Literature, and Nomenclature, and begs leave to offer the following: "Manual and Artistic Training in our Preliminary Education," by R. H. Hofheinz, D.D.S.; "Dental History, a part of the College Curriculum," by B. J. Cigrand, M.D., D.D.S., and "Roentgen Rays," by C. Edmund Kells, D.D.S.; also a historical paper by J. A. Chapple, D.D.S., entitled "The Legal Status of the Graduate Dentist."

Under the head of nomenclature only one paper has been presented,—namely, "Dental Articulation and Occlusion," by Wm. Ernest Walker, D.D.S.

All of these papers will be read by their authors.

S. H. Guilford, *Chairman,*
M. F. Finley, *Sec'y.*

SECTION II.—Continued.

Manual and Artistic Training in our Preliminary Education.

PAPER BY R. H. HOFHEINZ, OF THE SECTION.

MR. PRESIDENT and Gentlemen: The subject of education seems almost exhausted. There is hardly a meeting of a scientific body where one or more papers are not devoted to it. In view of this fact, it may seem presumptuous to come before you with another presentation of the subject. My excuse is that my views are somewhat different from those expressed by others, and for that reason I risk the charge of discussing a trite subject.

Before pointing out what education should be, I ought to point out briefly what it has been. In the great work of Quintilian, which is the first complete sketch of theoretical education, the importance of studying individual disposition is strongly urged. We have here the first attempt to specialize education.

The education of the Middle Ages was either that of the cloister or that of the castle; they stood in sharp contrast to each other. The object of the one was to form the young monk; of the other, the young knight.

About 1500 Erasmus broke away from this conception of education. Before his time Latin had virtually become a dead language, but he insisted that it should be taught so as to be of use, —a living language adapted to modern wants; he also took account of individual peculiarities.

Sturm, the great teacher at Strassburg, whose students numbered thousands, comprising all nationalities, taught principally pure,

elegant Ciceronian Latinity as the best equipment for the gentlemen of that century. In 1600 Comenius conceived that if teachers would follow nature, instead of forcing it against its bent, education would be much improved.

The earliest teachers recognized the fact that nature must be consulted in all matters of education. The doctrine of evolution has illuminated every problem of human thought and action, though in many cases we have failed to grasp and accept the consequences of its teachings in all their important applications. But in no direction has it thrown greater light than in the direction of education. It has called attention to the importance not only of natural aptitudes, which the ancients and medievalists appreciated to some extent, but of specialization, which they knew little or nothing about. Thus I am brought face to face with the particular question that I wish to discuss,—namely, are we specializing our early preliminary education as we ought, as the doctrine of evolution requires?

We know that the dentist was evolved from the blacksmith, barber, and watchmaker in European countries, but with social and scientific progress it was inevitable that he should become differentiated and stand by himself. Excellence was obtainable in no other way.

Dentistry developed into a science of its own, and ranks to-day as a specialty of medicine. The assertion has been made that the time is not far distant when every dentist will be a physician. It has even been said that every physician should be a dentist. The latter statement I cannot accept at all, the former only with qualifications. Dentistry without medical science to-day is an impossibility. All sciences are more or less descriptive, because further development may change them at any time; and a one-sided scientific education is apt to become as harmful to a profession that is largely based upon technical and artistic execution as a one-sided technical training would be. This has been thoroughly recognized by all dental schools. The question arises, has it been recognized in the preliminary education of the dental student? Are the three years of dental education sufficient to thoroughly train unskilled hands which have had no previous chance for development, the mind having been properly trained in the preliminary schools for the reception of the higher branches of education?

All preliminary education is bestowed upon the mind, while all the executive functions of the physical system are ignored. The development of these executive functions is as necessary as a knowledge of the sciences tributary to dentistry.

Philosophy teaches that mental perceptions depend upon the senses, and that the faculty of comprehending objective phenomena is in the mind. Without the senses no object can enter the mind; no object can be understood by the senses. Only through the united operation of both can knowledge arise.

We have been convinced, and are acting accordingly, that the mind requires an amount of preliminary training formerly not dreamed of for the dentist. We bestow, however, but three times seven months upon the development of manual dexterity, not quite sufficient to atone for the neglect and omission of all such teaching during the entire time of preliminary instruction. It is here where we need a special preliminary education for the future dentist. I make the broad statement that a student who under favorable conditions has not developed some manual skill at the age of eighteen—the time for college entrance—does not possess the physical requisites of a good dental operator.

In my estimation, we should be in position to judge the physical the same as the mental equipment of the dental student previous to college entrance. The student who is not naturally endowed with a reasonable amount of manual ability will never become the dental operator so much needed. He is in the unfortunate position of Walter Scott's hero in Waverley, who says that "he was losing forever the opportunity of acquiring habits of firm and assiduous application, of gaining the art of controlling, directing, and concentrating the powers of his mind for earnest investigation,—an art far more essential than even that intimate acquaintance with classical learning which is the primary object of study." So great a philosopher as Emerson has recognized the need of a manual education. He says, "We must have a basis for our higher accomplishments, our delicate entertainments of poetry and philosophy, in the work of our hands. We must have antagonism in the tough world for all the variety of our spiritual faculties, or they will not be born." Manual dexterity is but the evidence of a certain kind of mental power, and it should go hand in hand in its early development with that of the mind.

The education of our students in this direction, preliminary to their admission to college, would necessitate the introduction of drawing and constructive work into all secondary schools. In England the so-called modern side has been added to the traditional course. In France the Lycée has its *cours spêcial,* in which mathematics and the sciences replace Latin and Greek. In Germany the well-established Real Gymnasium and Real Schule are justifying more and more their right to exist on an equal plane with the Gymnasium itself. An especially interesting movement in Germany is one which endeavors to establish an "Einheitsschule," a combination or unification school, in which the main features both of the Gymnasium and the Real Schule are to be united.

N. M. Butler, Professor of Philosophy and Education in Columbia College, in a paper on the "Function of the Secondary School," says, "The course of study that I would suggest for the typical American secondary school is one in which these elements are always represented,—namely, the mother tongue, geography and history, natural science, mathematics, Latin, Greek, French and German, drawing and constructive work (manual training), and physical training. This would not be unlike what German students of education have in mind under the name of Einheitsschule.

"Pupils of a different temperament, of different points of view, and with different purposes in life, would be guided to express and to satisfy themselves to the fullest extent possible.

"To introduce this subject generally into the secondary schools of this country would be a new departure, but only because its schools have not been doing their duty by the pupils intrusted to them. Taken together, drawing and constructive work constitute what is properly called manual training, the educational value of which has been established beyond all contravention both by argument and experiment. It aims to develop in the pupil powers of thought-expression that no other study reaches, as well as to train the judgment, to call out the executive powers, and to give self-confidence in dealing with actual material. In many secondary schools the pupils may wish to follow manual training beyond the mere rudiments, and with more special reference to its scientific and technological applications."

To whom does this apply more than to the future student of dentistry?

The scientific dentist is not scientific if he has not mastered thoroughly all the requirements of his profession, numerous scientific teachings requiring clinical skill, observation, and reflection to verify them. The special preliminary education which I here advocate must begin early in life. The secondary—yes, the primary—schools are the proper place for the development of that faculty which is most neglected. The great Froebel implanted constructive work in his immortal kindergarten system, and the proper continuation of it in the primary and secondary schools would allow an expansion of the manual faculty or would disclose a deficiency, and therefore an unfitness for the dental profession.

How many dentists have been complete failures owing to a total lack of constructive ability? How many beautiful things have been written and told, but never done, by some of our writers? Professor Tyndall says, "Half of our book writers describe experiments that they never made, and their descriptions often lack both force and truth. No matter how clever and conscientious they may be, their written words cannot supply the place of actual observation and of actual manipulation." There is a vast portion of human knowledge belonging to special pursuits, and whoever engages in any of them requires a training in the special science or art relating to them. We teach our young men to recite Greek verses. (Let me say here that Greek is one of the accomplishments the German University does not require of a student of medicine or dentistry any longer,—quite a step forward in the specializing of preliminary education.) The youths of Athens, however, were not required to study two dead languages for the best period of their school days; they were made the recipients of a practical scholarship. In 1844 our Emerson said, "We are students of words; we are shut up in schools and colleges and recitation rooms for ten or fifteen years, and come out at last with a bag of wind, a memory of words, and do not know a thing. We cannot use our hands, our legs, our eyes, or our arms." This may have been severe even in 1844. We have learned since to use our legs and arms, but not our hands and eyes. If we had learned to use our eyes we would not be so sadly lacking in one other element of our education, an element which must also be instilled early in life, and without which we are drifting into a rudeness of operative and technical skill very conspicuous and much to be lamented,—namely, artistic taste.

Numerous protests have recently been made in dental meetings and journals against the indiscriminate use of gold crowns on the six anterior teeth. What does this signify? It signifies that the dental operator and the patient are lacking the proper esthetic training; it signifies that we have not learned the proper use of our eyes. The esthetic inheritance, that feeling for the beautiful and sublime in nature and art which was so well understood by the Greeks, is largely lacking in us, and unless we are to degenerate in our skill we must see that that esthetic inheritance is placed side by side with the scientific in the education of the dentist.

The absurd remark has been made that the dental colleges and their teachers are to blame for this deficiency. They are not to blame for a degeneracy, for a lack of early training. Our age is possibly too pre-eminently scientific. A French critic of the last exposition in France said, "Our own time is being characterized by the infusion of scientific theories, by the logical necessities of imitating everywhere nature's observed processes and methods. A strong realistic tendency prevails not only in literature and art, but everywhere. It means spiritual servitude. It means fatalism." Some of this fatalism is showing itself in our profession. The realistic tendency of the mind of the dentist lacking incentive, the realistic tendency of the uncultured multitude, are to blame for the hideous work of some of our dental operators.

Public education in art is needed. Individuals here and there have always had art training, but it is too generally assumed that art education belongs only to the few. Goethe says, "Men are so inclined to content themselves with what is common,—the spirit and the senses so easily grow dead to the impressions of the beautiful and perfect, that every one should study to nourish in his mind the faculty of feeling the best things by every method in his power. It is only because they are not used to taste of what is excellent that so many people take delight in silly and insipid things, provided they be new."

It would be a sad fact if scientific education would have to mean a stifling in children of that spirit which alone can make facts vital and inspiring. The art spirit should enter into every-day labor. The public, or at least all primary schools should take account of the higher nature of the child,—the esthetic faculty, which belongs to this higher nature. Art and science should never become

separated; they belong together; they should walk hand in hand as sisters. All the instruments of precision that have contributed so much to human knowledge had their origin in the workshop; art cultivation refines the sensibilities and has an elevating effect on all minds.

The question may justly be asked here, To what extent would manual and artistic preliminary training interfere with the required academic teaching? The only competent answers we can get are from teachers of grammar and high schools where manual training is optional. In the report of the Commissioner of Labor on Industrial Education, 1893, he tells us that Dr. Belfield made inquiries regarding the influence of manual training on book-work, and presented the results in tabular form. I quote but a few, and only of schools where the constructive work is optional.

H. W. Campton, superintendent of the High School, Toledo, Ohio, says, "I think the effect of manual training on the minds and characters of pupils is healthful and wholesome; those who take manual work do just the same amount of work in text-books as those who take no manual work. So far as I can judge from general observation of the characters and the mental work of the pupils, I see but little difference in the two classes of pupils."

R. D. Crawford, superintendent of the public schools, Tidioute, Pa., says, "They do as much work and fully as well."

A. H. Fetterolf, president of Girard College, Philadelphia, Pa., says, "Our experience is that boys do better in academic work with practice in manual training; they show more intelligence in comprehending whatever is brought to their notice, while in general they have a wider range of thought."

Addison Jones, superintendent of public schools, West Chester, Pa., says, "The boys do as much book-work, and I believe do it better than the girls, who do not take manual training."

A. J. Steele, principal of Le Moyne Institute, Memphis, Tenn., says, "In mathematics and science, direct and undoubted help. In literature and generally, can see no injury. The tendency is to train or lead to natural methods of study; cramming or mere memorizing is dropped for real study."

B. R. Dudgeon, superintendent of public schools, Menomonie, Wis., says, "The academic work did not suffer in the least. In many cases, especially among the slower pupils, the academic work

seemed to improve. I did notice that the pupils who were noticeably careless in their work in academic lines became ambitious to do work which compared favorably with that of other pupils, and it seemed to me that these pupils were somewhat inspired by a self-respect and pride which reached beyond the school."

This does away with the objection that the ordinary observer might make,—namely, the sacrifice of the academic work for that of constructive work.

I hope that I have not been misunderstood. I do not expect to set up a curriculum of technical and esthetic training to take the place of the classical and scientific. Far from it. It has been my aim to show to the regents and examining boards that it is not the question of quantity of points which are necessary for the proper preliminary education, but pre-eminently quality of points.

As Helmholtz has remarked, "We see scholars and scientific men absorbed in specialties of such vast extent that the most universal genius cannot hope to master more than a small section of our present range of knowledge." The almost infinite range of human knowledge compels each student to select a course of study narrow and narrower all the time. The preliminary education must adjust itself to the needs of the future more and more, and nowhere is this more necessary than with the future dentist. His early training must have a more specific direction, not at the expense of science, but for its benefit.

Professor Fiske, in his "Destiny of Man," says, "All human science is but the increment of the power of the eye, and all human art is the increment of the power of the hand. Vision and manipulation—these in their endless and transfigured forms are the two co-operating factors in all intellectual progress."

Hand in hand with the training of the mind must be that of the hand and eyes, if we are not destined to that fatalism in operative dentistry that is beginning to make itself so brutally felt. The intellectual stimulus of constructive art is more vigorous than that of literature; we are continually stimulated by the presence of the object and the operations to be performed. The perceptions become clearer, more positive, more precise. It is a great mental discipline; yes, I go so far as to say it is a great moral discipline. It leads to more exact action; it leads to greater honesty, for honesty is but the moral expression of exactness.

DISCUSSION.

Dr. Jas. Truman: I am glad that some one has had the moral courage to denounce the inartistic operations that are daily performed in dentistry. To my mind the statement of the essayist is correct, that we lack esthetic culture when we place a gold crown on a front tooth.

I was particularly pleased with that portion of the address in which the essayist stated that a young man who at eighteen had failed to acquire manual dexterity could rarely or never acquire it. That has been my belief for many years. When a young man attempts the study of dentistry, takes first four years of medicine, after having passed through his early preliminary training in the high schools or colleges of the country, he will probably be twenty-two or twenty-three years of age when he begins the study of dentistry, and I contend that by that time the whole practical manual ability of that young man is lost. Hence we find that those who have taken the medical course in our dental colleges rarely or never acquire manual dexterity unless they have special mechanical ability. Let us take this to heart.

I wish to congratulate the essayist on the very excellent preparation of his paper. I regard it as almost a model of its kind.

Dr. Black: This paper has interested me greatly. First, I want to compliment the essayist upon the literary character of his paper, and I wish to accentuate what Dr. Truman said upon that point. It is most excellent, and the thought contained in the paper is what we need at the present time. I am most heartily in accord with the idea of the necessity for the acquirement of manual training in our school career. While students are yet young they should learn to use the hand; not in an ideal way, but to accomplish something, to produce something that shall be useful, or something so conceived and constructed as to train the hand to useful purposes. With all our boasted skill in the technique of dentistry, there is yet much to be gained in the future in the skill of the hand, and perhaps more in the direction of that manual skill by the mind,—the development of that which will be of lasting use to our patients, the mind and the hand working together for good; not only for that which pleases the eye, but for that which is so conceived and constructed that it shall endure. This means much to us in the mental make-up of the man, as well as in the make-up of his handicraft.

I wish now to accentuate what was said by the essayist, and also what was said by Dr. Truman, in regard to placing gold crowns on front teeth. It seems to me that that is a mental debasement. The wonder is that he who has no more taste than to do such a thing should find patients who would submit to it; the greater wonder that a man supposed to be educated in the taste and skill of which dentists boast would do such a thing. I commend this paper to you, gentlemen, for future study when it shall be printed, a paper to be read and re-read in the year before us.

Dr. Sitherwood: I only wish to say a very few words in favor of this paper. I was greatly impressed with it. For a proof of its truth I only call your attention to the fact, which is well known to all educators, that there comes a time in the life of every individual when he cannot learn to write, when the hand refuses to obey the mind, when, in other words, it will take him years to learn to write his own name.

Another thing to which I wish to refer is the growing tendency of students to go into dental colleges with no other preceptors than the faculty. Thirty or forty per cent. of the students who enter dental colleges have no other preceptors. I claim that the student who has no manual training in a dental office before he goes into a dental college cannot in the few years he is there acquire the manual skill that he would otherwise acquire if he had had some manual training in an office before he entered the college. In proof of this, if you will take a graduate from the best dental college in this country into your office and put him to making a piece of bridge-work, plate-work, crown, or whatever it may be, you will find he is deficient in manual skill unless he has learned it somewhere; that is, if he belongs to the thirty or forty per cent. noted on the printed lists of the college as having the faculty for his preceptor. I understand that there are some gentlemen who do not desire to have students in their offices, but it is a misfortune to the young man who goes into a dental college not to have had some previous training, just as the essayist has stated that it is a misfortune to the student not to have had training in drawing, or whatever it may be. You all know that there is a tendency among educators at the present time to give this manual training to the young, because there comes a time in life when they cannot acquire it.

Dr. Brophy: I have listened with a great deal of interest, pleas-

ure, and profit to the paper which has been read, and I approve most heartily of the sentiments expressed therein, and also of the sentiments expressed by the first two speakers in the discussion; but I must confess that I am quite surprised at the utterances of the last speaker. It is quite evident that he is discussing a condition of things that existed about twenty years ago. At the present time the average young man enters a dental college after spending several years in an institution where manual training is insisted upon, and when these young men come to college they are not ignorant of the use of instruments. They have acquired a knowledge of them, and they are prepared to take up the study of dentistry intelligently. Moreover, in the course of technical work now done in schools of dentistry a student can learn more in three months than he would in about as many years in anybody's office. So I think that the remarks of the gentleman (Dr. Sitherwood) about the deficiency in manual training of the young men of to-day are not well founded.

Dr. C. N. Johnson: I have promised not to take up much of the time of the meeting, but I was very much pleased, as the other speakers have been, in listening to that paper. There is just one feature of it, however, to which I want to take exception; not to the ideas expressed by the gentleman himself in his paper, but to the impression that may go abroad as a result of the paper. That is, that the tendency to-day is to specialization to too great a degree. We are in danger of that. I have always been something of a stickler for the broadest possible fundamental education for a professional man of any kind, and I fear that if we carry this matter of specialization too far we shall become narrow-minded, because that is the tendency of too much specializing. And I want to say that of all the narrow-minded men I have ever known on the face of the earth, a narrow-minded dentist is about the most narrow-minded. In the practice of our profession we are obliged to work all the time upon the minutiæ, upon the little things, and unless we are very careful we shall become narrow. While having in mind the sentiments expressed in the paper, we want to keep in mind as well the sentiments of broadest possible culture in our education, otherwise we shall not be known as an educated profession.

Now, just one word more in regard to the remarks of my friend, Dr. Sitherwood. I would have been in sympathy with him at one time when he made the statement that the best student was the one

who had two or three years in a preceptor's office before coming to college, but I wish to say that it depends largely upon the preceptor and largely upon the college, and in my experience in college work I have almost invariably found that in the cases of many students sent to us by practitioners we were obliged to spend the first year at least in correcting the mistakes of the preceptor's teaching. That does not necessarily apply to all students, but it has been an actual fact; and I wish to say that the gentleman who makes such a statement as I have referred to, or to any gentleman who thinks as he does, that if they will visit the dental colleges of this country and see the extent to which we are introducing manual training from the very bottom until the student leaves us, they will have a higher idea of what we are doing in that direction to-day.

Dr. Sitherwood: Do I understand Dr. Johnson to decry the idea of a young man preparing to enter a dental school under the guidance and teaching of a preceptor?

Dr. C. N. Johnson: I made the remark that it depended largely upon the preceptor and largely upon the college. If we have a good preceptor, who will give his student the best facilities to study and to develop this manual training, I have no objection at all to that student being under a preceptor. Some of the best men in this room never attended a dental college at all. I have as much respect for my profession as any man, but it is a fact that in many offices to-day the methods that are taught the student are the methods of a quarter of a century ago, and they are not in accordance with the methods that should be taught to-day.

Dr. Sitherwood: I am ready to grant that, but I was discussing principles, not individuals.

Dr. Newkirk: It has been a long time since I have heard a paper which interested me more, and the principles of which seem to me to be more nearly correct, than that to which I have listened to-night. I was particularly struck with the statement that unless the young man develops some manual skill, the ability to do some one thing with his hands early in life,—and I think the age of eighteen is reasonable,—he will not succeed in the work of operative dentistry. I have a rather striking example in my own experience to corroborate that view. I was a farmer's boy, and my hands, of course, were clumsy; but at the age of sixteen I had the disposition to do something mechanical, and I took up the

study of penmanship. I had a friend who gave me some instruction, and he told me to take the finest kind of a pen and to make fine lines with a slow movement. So, after working all day on the farm, I sat up nights, sometimes until midnight, to cultivate that talent, until I had control over the pen and could guide it as I wished, although when I began my fingers were absolutely uncontrollable. To that first training I ascribe the steadiness of hand and nerve which I believe I possess to-day in the handling of dental instruments. Now, it seems to me there must be the disposition in a boy to do something of that sort with tools or else he will never by any sort of training succeed in the practice of dentistry.

One word more in regard to what has been said by Dr. Sitherwood, Dr. Brophy, and others. I used to be rather favorable to the idea of the students spending some years under a preceptor. Lately I have visited some of our schools in Chicago, which have been conducted on the modern plan, and have seen some of the preliminary technical work of the first-year students, and I must say that it was a revelation to me. If Dr. Sitherwood will visit those schools where this technical work is carried on, he will get a revelation.

Dr. Sitherwood: I have visited them.

Dr. Newkirk: Did you see what I saw?

Dr. Sitherwood: I did.

Dr. Newkirk: Well, it did not make the same impression on you that it did on me.

Dr. B. Holly Smith: It is unreasonable to suppose that any one could outline or sketch with accuracy the probable future of a boy who starts into his life-work. I have had boys who, without any experience with a preceptor and without any apparent manifestation of peculiar mechanical ability, have developed into remarkably clever and skillful operators. I claim that you may have your polytechnic institutions, you may have your system of training in dental offices, and still you have not the ideal system probably for every boy. All boys are not alike. My boys do not resemble, to me at least, the boys of my neighbors. My neighbors' boys are bad boys, and my boys are good boys always. You do not know what intellectual or mechanical turn your boy is going to take. I have no doubt that under our present system of training, which Dr. Brophy has outlined, there is probably an ideal system; that is, the system of sending your boy to some polytechnic institu-

tion, where his mind and his hand are trained together. The old system of tutelage under a preceptor will gradually improve as the preceptors are developed. Remember that preceptors all over this country are developing. A young man who had been a student at our school, and who by courtesy was invited into my office for three weeks, was taken by me to the side of my chair during that time. He was a former pupil of a college in this State, and he told me that he had learned more in the three weeks when he stood by my chair than he had learned in school. If preceptors will take the boys and stand them by their chairs, then I would say no student should ever come into a dental college who had not received some instruction at the hands of a preceptor. But what do we do with them? Often they are put not even in the first laboratory, but away back in the last laboratory; this boy attends to the vulcanizer and other things, and probably collects a few bills on the outside. Now, if you gentlemen want to say that colleges shall not receive any students except from a preceptor, be honest, be fair, and I think you will be right.

Dr. Hofheinz: I was apprehensive that I should have nothing whatever to reply to, because the remarks of Dr. Truman, Dr. Black, Dr. Brophy, and others were so very flattering and so much in accord with what I said that I thought I should not have to reply. I am very glad that Dr. Johnson has spoken, because I take exception to his exceptions. He remarked only too correctly that to specialize our education too much will narrow our intellectual horizon; but remember that what I have here advocated is not intended to narrow the horizon, but to broaden it. It gives the boy a chance to decide for his future; to say to himself, "I am fitted for a profession which depends largely upon manual and artistic skill." He is unable to do that if he has not received the training that I have here advocated. If he is obliged to enter a college or a dental office without such previous assurance, it will necessitate an expenditure of time which will narrow down his other studies. The very effects desired by Dr. Johnson, where manual training and mental training go hand in hand, are found under this system, and in proof of that I have quoted abundant authorities in my paper. I will not undertake to refer to them all now, but one of them says that "pupils who were noticeably careless in their work in academic lines became ambitious to do work which compared favorably with that of other

pupils, and it seemed to me that those pupils were somewhat inspired by self-respect and pride," etc.; and it is the opinion of these authorities that it does not narrow the mind, but that the mind is broadened by that specialization in early training which gives them a chance to choose the proper sphere in life.

I want to thank the first two speakers for their complimentary remarks in regard to the literary style of my paper. Perhaps that is not due to myself, but to the fact of the many quotations which I have given from such eminent men as Emerson, Goethe, Fiske, etc.; but if I have ever been rewarded for an effort made under physical difficulties, I certainly have in writing this paper.

SECTION II.—Continued.

Dental History—A Part of College Curriculum.

PAPER BY B. J. CIGRAND, OF THE SECTION.

ONE of the most gratifying evidences of the progress of modern dental science is the ever-increasing interest manifested in historical research, and the study of the development of the various branches of dentistry. The profession is gradually comprehending that the proper way to learn lessons of wisdom for the uncertain future is to give immediate attention to the events of the past. The faculties of the dental colleges are especially earnest in advocating that in order that students may more fully appreciate the greatness of the dental fraternity, it is necessary that they become familiar with the origin, growth, and present high standing of the dental profession.

In dentistry the advancement in the art and science during the past forty years has certainly surpassed the progress of most, if not all, of the other professions, and stands prominently among the forward movements in the learned vocations.

As you well know, it is only of late years comparatively that dentistry has occupied anything like a properly recognized position among the different departments of medicine, for we learn that not long since it was practiced to a large extent as a superadded means of livelihood by persons engaged in some other pursuit, and without any professional education or discipline whatever.

Under the very shadow of the famous European universities, oral surgery and dentistry were professed by the blacksmith, barber, bather, jeweler, silversmith, monk, and even the cobbler. But matters were not destined to so remain. Educational matters began to receive attention after the invention of printing, and the discovery of America led the way to future triumphs.

Dentistry had as yet received no great impetus, nor had the art met the people who were to raise it to the plane of professional dignity, and later in their acquaintance introduce the mere art to its superior companion, the science.

But latent beams of the science were assured to appear, and we can be proud to say that the initial steps toward progress and attainments were taken in our own dear, native land.

It was during the period covered by our war for independence, something over one hundred years ago, that dentistry was introduced into America; but it was yet in its crude state, lacking mature, modern development. The public becoming aware, by benefits received, of its indispensability, gave encouragement and increased patronage, and the practicability of the dental college and the dental society was natural and apparent.

Not until these new factors entered the field of dental progress did dentistry become the subject of much critical inquiry. From this time on men of education and talent devoted themselves to it exclusively, and from this forward it has progressed rapidly in importance; so that within the brief period of fifty years its advancement has been so pronounced that to understand and to expound the whole extent of the subject is already beyond the possible.

The American dentists claim the glory of bringing about nearly all the strides of dental progress, and through their efforts have placed the profession in a commanding position. The mechanical devices and various labor-saving appliances, materials, and discoveries contributed by them to the true science and art of dentistry are numerous and important, the mere specification of which would consume hours of time.

To the faithful dental student who is ever yearning for fresh draughts of information, every subject that pertains to the history and progress of dental art and science is fraught with the deepest interest, and possibly no feature in the annals of dentistry solicits his attention sooner or merits such sincere consideration as does the story of this young, yet important, profession. The dentist who is ignorant of the trials and tribulations of the early surgeon-dentists is not unlike the patriot who glories in the triumphs and achievements of his native land, but knows not of the making of the established institutions he so fervently loves; such patriotism is but local and superficial at that.

There is an Arabian saying, "If you are about to acquaint yourself with a man, first learn where he was born, and next how he was raised." This good advice in sentiment might well be given to those who are about to acquire a knowledge of the mysteries of the arts and sciences,—namely, first learn of the origin of the art and science, and next determine its progress.

The dental practitioner, on the contrary, usually toward the end of his professional career learns of dental progress and history; while had he gleaned the information in his initiatory studies he would have more fully appreciated membership in the noble calling.

It is not my purpose to recite to you any data of a historical nature, or to detail events portraying dental progress, only in a referential manner, but I do hope to be understood as making an earnest appeal in behalf of the recognition of the labors of those who have sought to gather the fragmentary knowledge of dentistry and weave it into a true history of this science. The committee created by this body has diligently worked to perfect a plan of operation, and solicited the assistance of such persons as might prove of service in compiling the intended history of the profession.

I respect the good intentions of the chairman, Dr. McManus, and feel honored to be requested to advocate the purpose of having a dental history, one bearing the seal of approval of the National Dental Association. Because of my personal effort during the past few years in bringing the subject before the notice of the profession, I was sought to read this paper. You will therefore indulge a few personal references, as the recognition of this theme is largely due to my labors in this direction, and invites a brief *résumé* of the work. My first labor in this field of study dates back to 1887, when in a valedictory to my classmates at the Lake Forest University I chose as my address, "The History of Our Profession." In the preparation of this essay I observed, much to my surprise, that the profession possessed nothing in the form of a volume affording an account of the world's progress in dentistry. In 1892, when I accepted the professorship of dental prosthesis in the American College of Dental Surgery, I arranged with the faculty, in addition to that work, six lectures on the subject of dental history. At the request of the class I published these lectures in book form, entitling the volume "The Rise, Fall, and Revival of Dental Prosthesis." This edition, with the exception of a few copies, was entirely exhausted in

Chicago. A second edition was a natural outgrowth, and, having noted carefully the imperfections that revealed themselves on a studious review, I concluded that a thorough revision of the entire work was necessary.

In the work of expurgation and amendment of the first edition, I availed myself of many of the suggestions made in various reviews of the original book, and I take this opportunity and occasion to express my sincere thanks for the consideration shown toward it, both by reviewers and readers. None knew better than myself how numerous were its imperfections. The manner in which they have been overlooked has served to convince me that those who were judges of the art and science, and could deal authoritatively, were disposed to *encourage any attempt at improvement, even though such attempt were marked by numerous shortcomings.* Doubtless the kind reviewers saw that the book aimed at much more than was directly expressed in its pages.

Such sources of information were consulted as were deemed advantageous toward compiling and completing the work. Among these I gladly mention the *Dental Cosmos, Dental Review, Items of Interest*, Dexter's "Oral Surgery," and many voluminous references in the various dental libraries of the United States.

When, in 1896, I was elected to fill the same chair in the Northwestern University Dental School, I likewise gave a course in dental history, and the interest manifested by the class led me to believe that the course was not only interesting, but profitable as well.

The Illinois School of Dentistry, recognizing the good resulting from this course, elected me to the chair in the faculty entitled "Dental History and Prosthesis." The American College of Dental Surgery and the Northwestern University Dental School were the first dental institutions to give a course in this branch of dental education, while the Illinois School of Dentistry is the first dental college to create a professorship in dental history.

There are at present six medical colleges which include in their course of study the subject of medical history, and a text-book on this branch has recently been published by Dr. Roswell Park, of Buffalo. The chapter on dental history is the outcome of a lecture before the students of the dental department of the University of Buffalo, whose dean, Dr. Barrett, has unearthed a considerable amount of important data on dental history.

To those of the profession who have been in practice for a period of years this subject may not appeal as of vital importance. These veteran practitioners are quite familiar with dental progress; in fact, their lives form a liberal share of the story of dental advancement, since their very careers are interwoven in its progress. Yet it must occur to these wise men that the profession is not fully assured of continued progress unless those who are being initiated into its mysteries are acquainted with the past, in order that they may more thoroughly appreciate their life-work and avoid the pitfalls which must lie in the way of those who remain ignorant of the professional highway.

As regards the benefits to be derived from a historical review of dental history, Dr. Patrick, who wrote several excellent articles on this subject, once said, "I have been of the opinion that there is a growing desire in our profession to be more conversant with the ancient as well as the modern history of dentistry in its several departments; that there is a conviction that the literature of dentistry has been neglected."

Dr. William H. Trueman, of Philadelphia, wrote an article entitled "A Chapter in Dental History and Biography" (*International Dental Journal,* July, 1897), "The Advent of Dental Science in the United States" (*Dental Cosmos,* September, 1896), and both of these papers emphasized the need of education along historical lines.

At a meeting held in Washington, in December, 1895, Dr. R. Finley Hunt read a paper entitled "Dentistry a Distinct and Independent Profession,"—"a position based upon undeniable historical and current facts, and not upon theories supported by arguments." He also wrote another (read at a union meeting held in the same city, in May, 1896) entitled "The Dental Profession; Some Points in its History." This paper expressed the hope "that his efforts would incite others in the near future to furnish a full and complete history of dentistry."

During the past twenty months upward of seventy-five papers have been read or published treating of dental history. Those deserving special mention are: "One of the Present Needs of the Profession," by Dr. Charles McManus, in the *Dental Cosmos* of January, 1898; "Ancient Dentistry," by Dr. F. K. Ledyard, in *Items of Interest,* October, 1897; "Claims of Ancient Dentistry," by Dr.

Wm. F. Griffith, in *Items of Interest,* December, 1897; "The Dental Profession," by Dr. F. LeGrand Ames, in *Items of Interest,* April, 1899; "Professional Inspiration,—Its Source and Sequel," by Dr. B. Holly Smith, in *Items of Interest,* June, 1899.

This seems a most opportune time for the profession to perfect a history of the profession, as we are at present living in the commemorative period of our profession. From now on we will be in the happy era of celebrating centennial anniversaries of milestones in our progress. One hundred years ago this August Sir Humphry Davy discovered and demonstrated the great utility of nitrous oxid gas, a find which has been universally recognized as one of the important discoveries of the century.

Again, this is an opportune time, in that we can present at the Paris Exposition a full and complete story of the marvelous growth and development of the profession in America.

If we proceed with earnest vigor to prosecute the research and completion of this most fascinating story of our profession we can readily realize the full pleasures of our anticipations, for the material in hand, including innumerable personal letters, published articles and books, together with various correlative data, makes it possible to warrant a thoroughly satisfactory account of the advancement of the profession in the Western Continent.

No nation of people should feel so heartily interested in the historical narrative as the Americans, to whom is due the credit of having contributed nearly all the elements of progress which have placed the profession prominently among the liberal vocations.

If this Association feels that the undertaking is too momentous, let the work be confined to preparing a history of the profession in America. And the proem in the work might contain a brief, yet thorough *résumé* of dental progress in Europe and the Orient in ancient and modern times. But let the volume aim to present American progress in particular. Further, it will be of greater interest to all, and it will be of more universal service, if the history be written in a thoroughly national spirit, leaving the progression in the various States to be written up and put in book form by the several State dental societies. In this way there would be little clashing between authors, and the State history would bear an important relation to the National volume.

Dr. Edward C. Kirk, in an editorial, page 389, *Dental Cosmos* for

1896, says, "The history of dentistry has not yet been written, but it ought to be. The time is propitious, and the longer it is delayed the more difficult it will be to secure a reliable result. An effort was made in connection with the World's Columbian Dental Congress to secure a history of American dentistry, but the result has not yet materialized. . . . Let us hope that a creditable history of dentistry, not only of America but of the whole world, may soon be forthcoming."

Dr. A. W. Harlan, editor-in-chief of the Transactions of the World's Columbian Dental Congress, appends the following to the report on dental history: "An exhaustive report on the history of dentistry in the United States is in the hands of the Committee on Publication. The report is made up of individual reports from the various States and Territories of the Union. It is to be regretted that the bulkiness of the work makes it impossible that it should be published as a part of the Transactions, and it is the hope of the Committee on Publication to see the report published on some similar occasion, when it can be brought down to the date of publication."

Now "a similar and suitable occasion" has presented itself. The Paris Exposition, which hopes to celebrate the closing of this eventful century, is the proper occasion for the appearance of a dental history, and Dr. A. W. Harlan, who is taking a deep interest in the great gathering of dentists in Paris, certainly will lend his aid in evolving the marvelous story of dental advancement.

While Chairman McManus recently wrote, "There are too many of the younger dentists to-day who have but a vague idea of the glorious history of our profession, and of the great men of the past, 'for there were giants in those days;' and without an accessible history, what can we hope for the future? The work must be done before the present generation fades away, before this century closes. For, as Dr. Francis, of New York, said the other day, 'if it isn't done soon it never will be.'"

With the great majority of the ethical practitioners and the large student-body anxiously awaiting the dawn of further light on this theme, why need we still hesitate? What seems to be the barrier, and wherein lies the solution? The time has fully arrived, and the opportunity is afforded of going before the great Congress of Dentists at Paris with the unparalleled history of the youngest sister of

medicine as a portion of our dental contribution, which will be hailed with delight.

DISCUSSION.

Dr. Chas. McManus: I am very much pleased with the excellent paper which Dr. Cigrand has presented, and, as a member of that Committee on History which occupied a few moments this morning, I am gratified at the interest he has always shown in the subject. Dr. Cigrand has quoted me, and I only wish to say that the words which he has quoted were written several years ago, when I was younger and rather more enthusiastic on the subject. I hope that the question may come up as soon as next year, but I am afraid that it will have to be taken up in a little slower manner.

Dental history certainly is a necessary part of the education of a dentist, in order to make him, as has been said, a broad man. The subject is of course in some respects a dry one, as dry as the most fastidious operator could hope for; but it certainly is one of much interest, and we hope that the efforts and enthusiasm of Dr. Cigrand and others will ultimately achieve a reliable and satisfactory result.

Dr. Ambler: I believe that the subject of dental history is fraught with a great deal of good if it is properly brought before the dental profession and the public. We as a profession are clamoring all the time for a higher standard. We wish to be placed on a level with the M.D.'s. In order to do so we must certainly make some advancement, and we believe that one thing to do is to have a proper dental history. The M.D. always has prided himself, and always will pride himself, a great deal upon the history of the past. He is always telling you of Æsculapius and Hippocrates, and those other ancients. Now, it seems to me that if we wish to put ourselves on a level with the M.D.'s in the matter of history we should do all we can individually and collectively, as State societies, and as the National Society, to have a proper history prepared. Very recently Dr. Roswell Park, of Buffalo, has prepared a history of the medical profession, and you often hear it spoken of by physicians and surgeons. A majority of dentists know that there is a dental history published by Dr. Cigrand. That is the best work we have up to the present time, but it needs to be added to and revised as the doctor has suggested. Now, this matter was brought before the National Association at a former meeting, but that was only the entering wedge. It accomplished a little good, because it called the

attention of members of the Association, and also of many non-members, to this matter.

As far as the writing of a dental history is concerned, there is a great deal of work about it. One way of getting at it has been suggested, and that is to have each State society take up the work of that particular State and compile a proper history. Then those could be gathered together by a proper publication committee, appointed perhaps by the National Association, or it could be taken as a private enterprise. Of course, if this matter of dental history is taken up entirely as a private enterprise, coming from the ground on which it now rests, as formed by Dr. Cigrand's paper, "The American System of Dentistry," and other works which contain a small amount of history, it is going to cost somebody an immense amount of money to compile it, and it will be an almost endless task. It will be a large task if taken up by the committee of the National Association. I want to speak of this especially because I want to call the attention of dentists, and laymen also, to this matter of dental history. We are a profession. We have a history, and it dates back three thousand years. Our history is older than the United States! It is more than one hundred years old! And we ought to be proud of it. We must have a book which will tell us the facts, and that book ought to be in the hands of dentists, especially the new ones coming into the field. I am very glad to learn that there are certain colleges which are teaching dental history. The Dental Department of Western Reserve has been teaching dental history, four or five lectures, accompanied with quizzes and an examination, for the last six or seven years. That is one of the institutions which Dr. Cigrand spoke of. I believe the time is coming, and I believe we are ripe for it now, when all the dental colleges will fall in line and teach dental history. I think there should be a course of at least ten lectures, accompanied with proper quizzes, and that the student should pass his proper percentage in dental history just the same as in any other study embraced in the curriculum. I think there should be a chair of dental history, and some others with whom I have conversed on the subject think the same. I think the dental profession cannot do anything which will place us on a better standing with laymen, as well as among ourselves, than to establish the fact that dental history has a real foundation; that it is something worth thinking about, and something worth

talking about. Why should we not do it as well as medical colleges? They are teaching medical history. Let us keep abreast with them. There is no question about the subject being an interesting one to students, as is well known by those who have talked upon the subject. When it is difficult to arouse the attention of the student on some abstract subject connected with dentistry, such as chemistry, physiology, anatomy, if you will just tell him that there was a man by the name of Lemaire he immediately wants to know when he lived and what he did, and he will listen right away.

One method of introducing dental history into the college course has been suggested; that of putting it into the Freshman year. That is one way, but the idea which has been carried out in one or two colleges has been to give it in the third year, so that when students go out of the college they will have the subject fresh in their minds; so that when some one says, "Why, dentistry is only sixty years old, only as old as the Baltimore College," the young graduate will be able to say, "Dentistry is three thousand years old." We want the student to be able to tell them just what was done three thousand years ago in dentistry, and have it right at his tongue's end. So we teach it in the third year instead of in the Freshman year, so that they will not have forgotten it by the time they leave the college.

Dr. Barrett: I will not be as prolix as the last gentleman was, but I want to say that I am more anxious to see proper history made at the present time than I am to see it recorded. As long as so many foolish traditions are crystallized into recorded history, incorporated into books, taught to students, and promulgated to the world, such as that crown- and bridge-work dates back to the Christian era, that the ancients filled teeth for prophylactic purposes, that caries of the teeth is of modern origin, and very many other exceedingly foolish assertions which have no foundation whatever in fact; so long as such fables as these are proclaimed we are not writing history, but are chronicling fiction and calling it history. We are belying the past and shrouding in darkness that which should be as the noonday sun. I am anxious to have a proper history written, but the facts must be winnowed from fancy and the course of events reduced to absolute truth. Men receive traditions that have been handed down from mouth to mouth, record them as established facts, teach them, crystallize them into history that will

be accepted by others, when they have no more foundation in truth than the veriest fable that ever was invented. We must learn to find out what is history and to separate it from that which is not history, and then we shall be properly ready to teach it and incorporate it into the curricula of our schools. Until we become intelligent enough to distinguish truth from falsehood, and honest enough to verify our assertions before blazoning them to the world, we will do well to be a little more modest in our vauntings and to continue a little longer as students before we proclaim ourselves teachers.

Dr. Black: You are all getting tired, and I thought I should not speak on this subject; but I do want to say a word. I wish we had a fourth year in which we might teach dental history, when the pupil is ready to receive it. How should we do it? Not by some written history, but by going before the class and outlining a course of reading in the old books; for instance, in the development of thought with reference to caries of the teeth. I should give them something of the history of the development of thought that I have given in the "American System," and send the pupils to the library and let them follow it through the old books, reading the sketches here and there, bringing up that history that is written by the men who wrote in old days and on up to the present, following up the same idea in other branches of dentistry, following the development of thought up to what we teach now. I would have that done in this fourth year, guiding the boys in their reading so that they will know something more about dental history than they get in modern books on the subject.

Dr. Cigrand: I have little to add to what I have said in my paper. What I have written was intended simply as an appeal to assist your Committee appointed by this body to prosecute the work along this line and assist in making dental history a part of college studium. Dr. Barrett has been extremely interested in this matter, and has given a considerable amount of energy to this subject, having aided me liberally; and he voices sentiments in which I fully concur. We need a history of dentistry; one that bears the seal of approval of this National Association, and if we have such a history I am certain that it will be a volume worth having. I wish to say that I doubt exceedingly whether, even though we work very earnestly, we shall have a general history of dentistry for some years to come,

for much of what we have believed in the past presents itself, as Dr. Barrett has said, in the sphere of mythology. But the history of dentistry in America could be prepared very soon, and be free from traditional quotations. I wish to close my remarks by saying that the efforts which I have made in this direction, humble though they may be, have been at least intended as a beginning, and I fully appreciate the kind spirit in which the book was received. The second edition was not intended as a history or a text-book, but simply as an index volume, containing references where various historical points are brought up, by means of which, as suggested by Dr. Black, you could find the volume and the page where a subject might be found, so that you could further investigate and satisfy yourself. That history cannot be created you all well know. History is, and can only be gathered and arranged. And when this Association lends assistance to the Committee appointed, as it has already done, then I am certain we shall have a history which, bearing the mark of its approval, will be worthy of being taught in every dental college in the United States, thereby broadening the curriculum and fitting the young man to go out and be a member not only of the social gatherings of his community, but prepare him as a serviceable member of dental societies.

SECTION II.—Continued.

Dental Articulation and Occlusion.

PAPER BY WM. ERNEST WALKER, OF THE SECTION.

THE teeth have two articulations and also an occlusion; first, the dento-alveolar articulation, of the classification *synarthrosis*, of the variety *gomphosis*;* second, the interdental articulation, a gliding movement of the lower upon the upper teeth; an articulation which, because of its great mobility, might be classed as *diarthrodial* but for the lack of synovial fluid.

In extremely rare cases the temporo-mandibular articulation appears to be a true hinge joint,—ginglymoid. I have met with but one perfect example of this condition, in which case there was no interdental gliding, and hence no interdental articulation. The teeth could only be occluded cusp to sulcus, the patient being unable to protrude the mandible or to triturate. This condition appears to be so extremely rare, however, that it may be classed as abnormal, there being as a rule more or less lateral and protrusive movement of the mandible, which causes the interdental gliding, an important consideration in the arrangement of cusps not only in prosthesis, but in orthodontia, in contour operations, and in peridental diseases.

Occlusion is the mere coming together of the teeth, principally cusps to sulci.

It would seem to be unnecessary to call attention to facts which have been long recognized were it not that changes in the nomen-

*This, though it is the accepted classification, is not absolutely correct, as there is a slight, though very essential, degree of movement in the dento-alveolar articulation,—not sufficient to be classed as *amphyarthrosis*, but too great to be strictly classed as synarthrosis; the classification is, however, as nearly accurate as our present nomenclature permits.

clature of this subject have been suggested and recommended, and by a few writers adopted, though not, as will presently be shown, accepted by the profession at large.

The suggestion or recommendation to which I have reference is that the term *articulation* be used only in its strictly anatomical sense in connection with the teeth,—that is, as describing the relationship of the teeth to their alveoli; the term *occlusion* to be used in reference to the relationship between antagonizing teeth, to the exclusion of the term articulation in this connection.

In the *Dental Cosmos*, December, 1896, pp. 1023 and 1036, may be found two lists of words the discontinuance of the use of which has been recommended, together with the words advised as substitutes. Among the condemned terms are found canine, eye tooth (cuspid), sixth-year molar, twelfth-year molar, wisdom tooth (first, second, and third molars), peridentium and periosteum (pericementum), fang (root), gum-boil (alveolar abscess), nerve (pulp), articulation (occlusion), and others. I also quote from the *Dental Cosmos,* December, 1897, p. 1026, as follows: "The articulation of the teeth, in anatomical parlance, is their relationship with their alveoli. For a long period dentists had applied the same term to express the contact relationship between the upper and lower teeth, thus having the same word to express two entirely different things. Recognizing the confusion which arose from this double application of one word, the term 'occlusion' was suggested and adopted to express the relationship between antagonizing teeth." The writer quoted also speaks of "the almost universal acceptance of these meanings of the words," but our dental literature, both journalistic and standard, fails to afford proof of any general acceptance of the application of the term articulation as thus restricted.

"The relationship between antagonizing teeth" presents itself in several widely varying aspects, more entirely different each from the others than are the two conditions of dental articulation, and the "confusion" arising from the "double application" of the term articulation becomes "confusion worse confounded" in the proposed use of the term occlusion. For, while the word articulation may be so modified by compounding, as in the terms dento-alveolar articulation, interdental articulation, etc., as to indicate clearly the idea sought to be conveyed, we have not that resource in the use

of the term occlusion; while the latter is clearly applicable to the position of the teeth when the mouth is closed and the teeth brought together, cusps to sulci, the cusps interlocking on both sides simultaneously, it would require a multiplicity of adjectives to adapt the term occlusion to the expression of all the different positions the teeth may assume in the lateral and protrusive excursions of the mandible in the function of mastication. In the effort to escape a minor difficulty we encounter one much greater.

I have therefore thought it advisable to bring the question before the National Dental Association, through this Section, that we may consider the advisability or otherwise of recommending for final adoption this proposed change in a long-established nomenclature. The generality of writers use the words articulation and occlusion in reference to the teeth with the specific meaning applied to them by Dr. W. G. A. Bonwill in his well-known treatise on "The Geometrical and Mechanical Laws governing the Articulation of the Human Teeth," from which I quote as follows:* "If there was but one movement to the lower jaw, and that up and down, we might possibly say *occlusion.* But this term applies more properly to the shutting of the lips or the closing of the mouth, and not to the motions of the lower jaw dependent on the articulation at the glenoid cavity, where the articulation is universal. Articulation is a word of action throughout, while occlusion answers to the mere act of closing the teeth and lips and keeping them closed; one is active, the other passive."

Articulation, as thus used, refers to the function and motions of the jaw, and denotes the position of the cusps of the teeth in the incisive function; occlusion denoting the position of the teeth when they are brought together in the position of rest, the upper and lower cusps interlocking on both sides simultaneously. In the "American Text-Book of Prosthetic Dentistry" Dr. Molyneaux uses these words (p. 346): "The lower jaw has only one position of complete occlusion, and that is when both condyles are resting in the glenoid fossæ and the mouth is closed."

The positions in articulation, on the other hand, are various, as, first, when the upper and lower buccal cusps are in contact on either one side or the other; second, when the morsal surfaces of the

*Reprint from Harris's "Principles and Practice," 12th edition, page 2.

incisors are in contact; third, when the jaw and teeth are gliding from the above positions to the position of occlusion.

In occlusion the teeth have a much greater amount of surface contact than in any position of articulation, the buccal cusps of the mandibular bicuspids and molars of both sides fitting into the sulci of the maxillary bicuspids and molars; in the majority of cases, also, in occlusion, the labio-morsal margins of the mandibular cuspids and incisors touch the lingual surfaces of the maxillary cuspids and incisors.

That the term occlusion is not deemed all-sufficient for expressing the various phases of relationship between the antagonizing surfaces of the teeth is evidenced by the continued use of the word articulation in this connection by our best writers, not only in our periodical literature, but more especially by the most recent authority in this line, "The American Text-Book of Prosthetic Dentistry." Dr. Essig, the very able editor of the volume, refers to Dr. Bonwill's system of articulation, and uses the words occlusion and articulation in the sense given them by Dr. Bonwill in his several chapters on "Molding and Carving Porcelain Teeth," on "English Tube Teeth," and on "Vulcanized Rubber." For instance, of porcelain teeth he says they must be so designed with reference to occlusion that they will, when articulated and adjusted to the mouth, perform the function of mastication with some degree of satisfaction to the patient (p. 225). Of English tube teeth he says they must be fitted to both the plate and the bite, lest on articulating they be found too short (p. 434). In the chapter on vulcanized rubber he says the articulation, properly so called, is taken in the mouth, the mouth being the true articulator (p. 484). Again, in cases of fracture of the lower jaw, he says the articulation is corrected by adjustment to the upper teeth (p. 548).

Dr. H. H. Burchard, who revised the proof sheets and who contributes largely to the volume, uses the word articulation in the good old-fashioned, but condemned, way not less than four times in fifteen consecutive lines (p. 661) in his chapter on "Selecting and Fitting the Teeth." For instance, he says, "The lower teeth are now fitted to the plate, articulating with the upper teeth." He speaks of "the articulating relations existing between the upper and lower teeth" in full artificial dentures as being the reverse of those existing in the natural teeth, etc. In his chapter on "Bridge-work"

the words are frequently used in the same sense, as, for instance, we are told that the teeth should be so articulated as to restore the lost masticating surfaces (p. 661); to get the articulation with cusp-buttons (p. 665); the articulating faces of a bridge (p. 671); a certain method is given as being designed to "secure increased accuracy of articulation" (p. 662), the result, however, being called "an accurate occlusion," the two terms being thus used as synonyms. Not to further burden my pages with quotations from this work, I will only add that the word articulation is used with reference to the antagonizing surfaces of the teeth by Dr. Goddard in his chapter on "The Principles of Metal Work;" by Dr. Molyneaux in the chapter on "The Bite or Occlusion;" by Dr. Ambler Tees in the chapter on "Continuous-Gum Dentures," and by Dr. W. W. Evans in the chapter on "Celluloid or Zylonite." Dr. A. H. Thompson, in the chapter on "The Temperaments," devotes a column in his table of temperamental characteristics of the teeth to their articulation other than dento-alveolar. In short, with the single exception of Dr. Ottolengui, whose subject, "Palatal Mechanism," affords no opportunity for the use of the word articulation, every author in this recent volume, made up of contributions from the most eminent authorities, and recommended by the Committee on Text-Books of the National Association of Dental Faculties, quite ignores the suggestion or recommendation of the discontinuance of the use of the word otherwise than with "its true anatomical significance."

Dr. E. S. Talbot, in his latest work, "Interstitial Gingivitis," just from the press (July, 1899), uses the word with reference to the masticating surfaces of the teeth.

It was also used in that connection by Dr. V. H. Jackson in a paper read before this Association at Omaha (see Trans. N. D. A., 1898, pp. 187, 196, 197); also by Dr. H. H. Johnson at the meeting of the Southern Branch, St. Augustine (*ibid.*, p. 363).

Although small space is given to prosthesis in our dental journals, yet the issues of the leading periodicals for the last few years, or since the agitation of this question, do not show any marked discontinuance of the use of the word in the sense contended for, or of the use of the word occlusion except where a true occlusion is intended, as defined by Dr. Bonwill, Dr. Molyneaux, and, more recently, by Dr. C. S. Butler.*

**Dental Cosmos,* February, 1899, page 176.

As reported in the *International Dental Journal,* 1898-99, we find the word used in this sense in papers and discussion of the Academy of Stomatology (Philadelphia), the Institute of Stomatology (New York), the American Academy of Dental Science (Boston), the Northeastern Dental Association, the Section on Stomatology of the American Medical Association, by Drs. R. R. Andrews, Robt. Huey, Geo. S. Allan, G. Lenox Curtis, R. H. M. Dawbairn, E. A Bogue, W. J. Younger, and others.

As reported in the *Dental Cosmos,* we find it used in the First, Sixth, Seventh, and Eighth District Dental Societies of New York, in the New York Odontological Society, in the Dental Society of the State of New York, in the tri-state meeting of the Maryland, Virginia, and Washington City Dental Societies; by Drs. Hofheinz, Root, Beebee, Holmes, Sweetser, J. T. Codman, Sweeny, C. S. Butler, F. A. Greene, Eschelman, S. G. Perry, C. W. Stainton, and by Dr. P. W. Moriarty, instructor in the Dental School of Harvard University, and others; and in the American Dental Society of Europe by Drs. W. Mitchell, Daboll, Stallman, I. B. and W. S. Davenport.

As reported in the *Dental Review,* we find it used in the Illinois State Dental Society, the Chicago Dental Society, the Hayden Dental Society, and the Minnesota State Dental Society; by Drs. C. S. Case, Nyman, Morey, F. F. Fletcher, Haskell, Ottofy, and others.*

---

*For the above and other instances of the continued use of the word articulation with reference to the antagonizing surfaces of the teeth, see *International Dental Journal,* 1898, June, page 407; September, page 608; October, page 692; November, page 742. 1899, January, page 36; February, page 103; April, page 262; May, page 342; June, page 348; July, pages 459, 462, 464. *Dental Cosmos,* 1898, January, page 81; February, pages 115, 163; March, pages 200, 240; July, pages 551, 552; August, pages 665, 673; September, page 762; November, pages 920, 933, 934, 947; December, pages 1010, 1024, 1025. 1899, January, pages 81, 97; February, pages 175, 177, 178, 179; March, pages 280, 286; June, pages 525, 546, 577, 578, 579, 580, 581, 583, 592; July, pages 647, 669. *Items of Interest,* 1898, February, pages 90, 96; October, pages 727, 728; December, pages 890, 899. 1899, January, pages 22, 24; March, pages 161, 190, 192; April, page 294. *Dental Review,* 1898, January, page 48; February, pages 80, 85, 147; May, page 370; August, page 627; September, pages 663, 671, 676. 1899, February, page 106; July, pages 554, 574. *Dental Digest,* 1898, March, pages 157, 158; July, pages 441, 456; November, page 773. *Ohio Dental Journal,* 1899, March, page 143; April, page 206; May, page 250.

If a student is taught that the word *articulation,* as used in dentistry in application to the teeth, has reference strictly and solely to the relationship existing between the teeth and their alveoli, and with this understanding reads, say Dr. Bonwill's classic paper on "The Laws Governing the Articulation of the Human Teeth," or Dr. I. B. Davenport's celebrated paper on "The Dental Arches of Man," and the numerous reviews, essays, and discussions which this paper has called forth, how meaningless they would appear to him. Give him the "American Text-Book of Prosthetic Dentistry" to study, with the understanding that the word articulation, wherever used with reference to the teeth, applies exclusively to their alveolar articulation, only the word occlusion applying to the antagonizing surfaces, and how incomprehensible much of the instruction given would be. Very much of our literature would require to be rewritten were this rule to be enforced.

Would it not simplify the matter to restrict the use of *the single word* articulation to those surfaces the articulation of which most nearly concerns us, reserving the more cumbrous descriptive compound term "dento-alveolar articulation" for less frequent use; an economy both of space in writing and of time in speech?

As it is always undesirable to make radical departures from long-established usage, unless very decided advantages are apparent, and as the words articulation and occlusion have been long used in a clearly-defined and specific sense, not only by Dr. Bonwill and his students and adherents, but also by many others of the most prominent men in our ranks, it would seem advisable to continue to use them in that specific sense, at least until two equally distinctive but better terms are offered us by which to indicate the two radically different phases of relationship between antagonizing teeth, which Dr. Bonwill has called "articulation" and "occlusion."

This view is quite in harmony with the reasoning of the Committee on Nomenclature of the American Dental Association, who, in the discussion of their report in 1895, in rejecting Dr. G. V. Black's proposed substitution of the name "occluding-frame" for the familiar term "articulator," argued in favor of the continued use of the old name, as follows: "*First,* because of its long usage; *second,* because it is a single word; *third,* because it is a word that is more suggestive of the operation to be performed;" adding, "and we cannot see that it will in any manner interfere with the nomen-

clature of the dental anatomy."* The name *articulator* does not suggest *an occlusion,* although the accepted definition of the verb "to occlude" given by Dr. Black is "to strike against, as the articulation of the upper with the lower teeth."† In the report for 1896 (p. 130) an articulator is defined as "an apparatus for obtaining the correct occlusion of sets of artificial teeth." The rejected term, "occluding-frame," would be more in harmony with this definition. If mere *occlusion* was our only concern our work would be greatly simplified, but much more is implied in *articulation.*

It is unfortunately true that the terms have been used interchangeably, or as synonyms, by a few writers, and it is the erroneous use of the words that I hope the Section and the National Association will condemn, and recommend that the word "occlusion" be used to indicate the impact of the mandibular against the maxillary teeth, cusps to sulci, in the position of rest; and that "articulation," without any modifiers, serve to indicate the contact of the incisors edge to edge, and of the molars and bicuspids cusp to cusp, and the gliding from the latter positions to that of occlusion.

Until some erudite scholar shall supply us with two new terms, free from the objectionable double application of those we have, and more than partially expressive, the old terms may well continue to serve our purpose as they have done in the past, though it is to be desired that proper discrimination shall be made by the few who have occasionally used them as synonyms.

---

*Trans. American Dental Association, 1895, page 123.

†Ibid., page 112.

SECTION II.—Continued.

The Legal Status of the Graduate Dentist.

PAPER BY J. A. CHAPPLE, OF THE SECTION.

AS a significant and valuable contribution to the history of dentistry in America, I submit a decision rendered by the Supreme Court of North Carolina on December 4, 1863, which for the first time, from a legal standpoint, made the dental surgeon co-equal with the physician.

When it is considered that at the time this decision was handed down the newspaper was an almost extinct institution, by reason of the scarcity of paper and printing material in that section, it is natural to infer that it was never printed in a newspaper and thereby failed to become a matter of general information.

It is also evident that this is the first and last legal decision bearing upon the relation and status of the dentist, since the distinguished chief justice declared "the question was new and had not, so far as I could learn, been decided." And that it is the last decision touching the legal status of the dentist in this country at least is more than probable, since the conditions which brought it about have not since existed until the declaration of war with Spain.

It will be readily noted that while defining the legal status of the dentist, the decision unwittingly has a threefold significance,—to wit,—(1) That the dentist, in the full significance of the term, is a physician; (2) That as such, according to the act of Congress, he is exempt from army service, and (3) The physician under the law being exempt from *jury* duty, the dentist can also claim exemption where it is not specially provided in the dental laws of the respective States.

From a further close analysis of this decision it is seen that only

"regular *graduated* dentists" can claim protection under it, for the judge distinctly declared, "With the aid of these depositions and the argument filed by Mr. Fowle for the petitioner, I am satisfied that a *regular graduated* dentist is a 'physician.'" So that, to carry the proposition to its logical sequence, the non-graduated "dentist" is not a physician, nor can he claim exemption from either army service or jury duty.

This decision is found in the sixtieth North Carolina Reports. Winston's.

In the Matter of Hunter:

A DENTIST is a physician, within the meaning of the Act of Congress, and is exempt from conscription by reason thereof.

PEARSON, C. J. The petitioner is thirty-seven years of age. In 1856 he graduated at "Philadelphia College" as a *surgeon dentist,* and has ever devoted himself exclusively to the practice of his profession, in which he is skillful, and in fact eminent.

The Act of Congress exempts "all physicians who now are, and for the last five years have been, in the actual practice of their profession."

The question is, Does the word "physician" embrace a surgeon dentist?

In a restricted sense "physician" means one who administers medicine to cure disease, but, in its proper sense, it has a broader signification, and means one who, by a knowledge of the nature and structure of the human system, and of the nature and properties of substances, cures the injuries and diseases to which it is subject.

It is derived from a Greek word, "phusis," nature—which is the root of many other words; "physic," medicine; "physic," to treat with medicine, to evacuate the bowels, to purge; "physics," the science of nature and of natural objects; "physical," pertaining to the material part or structure of an organized being, as "physical strength," "physical force," as distinguished from "moral force;" "physiology," the science of the functions of all the different parts and organs of animals and plants, the offices they perform in the economy of the individual, their properties, etc.

To say of a substance having the property to evacuate the bowels, it is a "physical herb," is not as appropriate as a "medical herb," because it uses the word "physical" in its narrow sense.

From its derivation I am satisfied I have given the word physician its proper definition, and it includes not only "doctors," who administer medicine and physic, but "surgeons," who, by a knowledge of the nature and structure of the human system, are able to amputate an injured and diseased limb, or to extract a ball with skill and as much safety to life and as little pain as the case admits of. So the question is narrowed to this: Does a surgeon dentist come under this definition of the word "physician," or is he a mere mechanic who cleans, plugs, and extracts teeth without the aid of science?

As the question was new and had not, so far as I could learn, been de-

cided, I adjourned the case and required evidence to be taken as to the course of instruction at dental colleges, the knowledge it was necessary to acquire in order to obtain a diploma and to practice with skill, and any other facts calculated to aid in the solution of the question: Is a dentist a machine merely, or a *surgeon,* devoting himself exclusively to one branch of the profession?

The depositions of many eminent gentlemen of the profession are filed; they all state that the course of instruction at the college includes anatomy, physiology, and *materia medica,* and a knowledge of all of these sciences is necessary to obtain a diploma and enable the party to practice with skill; and I concur in the opinion that a dentist is a "surgeon, devoting his practice to a specialty." With the aid of these depositions and the argument filed by Mr. Fowle for the petitioner, I am satisfied that a regular graduated dentist is a "physician." I will add that all who remember the time when "the doctor" carried in his saddle-bags that horrid instrument, a "pollican," and extracted teeth by main force, frequently bringing with it a part of the jawbone, will readily admit that the division of labor has contributed greatly to the improvement of this branch of the science, and the safety and ease to the patient; for now, instead of the "pollican" and brute force, there are various instruments fitted for each particular case.

Teeth are often saved by removing the decayed part and filling and plugging, and new teeth are inserted, adding as well to the comfort as to the looks of the individual; and if a tooth has to be extracted the "surgeon dentist," by his knowledge of "physiology," ascertains the condition of the system, and by his knowledge of "materia medica" administers the necessary alteratives to put it in proper condition; and by his knowledge of anatomy finds how the tooth is inserted in the jawbone, and knows what instrument will extract it with as little pain as possible, and without injury to the bone; and the depositions state that frequently surgeon dentists are called in to perform delicate operations on the "facial parts" (the upper and lower jawbone), which requires an intimate knowledge of the structure of the bones and the location of the arteries, veins, and nerves. In short, the teeth being more subject to decay and disease than any other part of the human body, I am satisfied not only that regular educated dentists are physicians, but that the human family are much indebted to them for confining themselves to a "specialty," that is, one branch of the profession, whereby that which was some years ago a mere mechanical art has become a useful and important science.

It is therefore considered by me that John W. Hunter be forthwith discharged with leave to go wheresoever he will.

The cost, to be taxed by the clerk of the Superior Court of Forsyth county, will be paid by J. H. Anderson. The clerk will file the papers in his office and give copies.

At Richmond Hill, December 4, 1863.

SECTION II.—Continued.

Roentgen Rays.

PAPER BY C. EDMUND KELLS, JR., OF THE SECTION.

"I set you up a glass where you may see the inmost part of you."—HAMLET, *Act 3, Scene 4.*

ABOUT twenty years ago Dr. Wm. Crookes, an eminent English chemist and physicist, made a study of the properties of matter in high vacua, the results of his observations being made public in 1879. He constructed what is now so well known as the "Crookes" tube, the original form of which is shown in Fig. 1.

This so-called "tube" consists of an oblong glass globe from which the air has been exhausted to the one-millionth of an atmosphere. Through the smaller end a platinum leading-in wire is fused, upon the inner extremity of which is secured a concave aluminum mirror termed the cathode. Another platinum wire, termed the anode, is blown in the lower part of the tube near the other end, and a glass stem permits of its being held in a wooden base.

If the negative pole of an induction coil be led to the aluminum disk and the positive pole of the same coil be connected to the other terminal, upon the excitation of the coil the most wonderful phenomena occur within the tube. These are accounted for by Dr. Crookes as follows: When gases are under their normal atmospheric pressure they are conceived to be composed of an infinite number of molecules, which are in constant motion in all directions at a degree of rapidity beyond conception.

Now in this "tube" the rarefaction has been carried to such an extent that there are relatively but few molecules of air remaining therein, and they are therefore free to bound from side to side or end to end of the tube, and in this condition Dr. Crookes claims to

have discovered a new form of matter, which he terms "ultra gaseous," or radiant matter.

Upon the excitation of this tube under the conditions just described the molecules radiate with tremendous velocity in straight lines from the aluminum disk, cross in their focus, and strike the glass upon the opposite side, there producing the most beautiful fluorescence. These rays, originating from the negative or cathode terminal, have been termed "cathode rays."

Dr. Crookes's investigations, it would appear, were confined entirely to this radiant matter and its *effects within* the tube, for which purpose he constructed numerous forms of tubes and studied the various properties of the newly-discovered "radiant matter," under different degrees of exhaustion of the tube.

Fig. 1.

For seventeen years the Crookes tubes were to be found in all parts of the land, and scientist and student were equally charmed with their study and the effects obtained from them.

But it remained for Professor Wilhelm Konrad Roentgen, of Würzburg, to send a thrill of surprise and incredulity throughout the civilized world when he announced that however beautiful were the features produced within the tube by the cathode ray, of vastly more wonder and importance were the effects produced beyond the confines of its glass walls.

In this age of surprises probably none has been greater than the announcement of the discovery of the Roentgen ray, which he, in his (un-American) modesty, termed the "X ray," with its power to penetrate substances that had hitherto been opaque to any rays known to science, and differing from ordinary light rays in that it passes through all substances more or less, and in straight lines, it having been found so far impossible to either deflect, reflect, or refract it.

Furthermore, he also discovered that it had the power to affect photographic plates precisely like the ordinary light rays.

The history of his discovery is as follows:

One evening he was at work in his darkened laboratory when suddenly he discovered that some paper saturated with the platino-barium cyanid which he held in his hand became slightly luminous. A few steps in one direction and the fluorescence disappeared; a few steps in another and it returned. Looking about for a possible cause, he discovered that a Crookes tube which he had been using some time previously and had left connected to his excited induction coil was covered with a black cloth. Upon approaching this tube, covered as it was, the fluorescence appeared; upon going away from it the fluorescence lessened and disappeared. Here was a discovery. A ray of some kind hitherto unknown, and even now invisible to the eye, was being emitted by the Crookes tube, passing through the black cloth and affecting the paper in his hand. He at once entered into the study of this most wonderful ray, and in December, 1895, announced his discovery to the world.

Probably the fact which renders this discovery of utmost interest and usefulness, as well as adds to its fascination, is the power of the ray to penetrate the human body.

Upon the original announcement of this discovery almost every one the world over who possessed a Crookes tube and an induction coil began experimenting, and most wonderful were the tales told of the power of the "Roentgen ray." Flaws were to be detected in armor plate, smugglers could no longer delude custom-house inspectors, facial blemishes, such as birthmarks, could be eradicated, the sex of the unborn child could be distinguished; nothing was incapable of accomplishment by this means.

However, it was not long before the real value and use of this powerful agent was realized, and things settled down to a more practical and successful basis; and its value in surgery and other branches of the healing art is fully appreciated at the present time.

The essentials for producing the Roentgen ray are, first, the apparatus for exciting the tube; second, the tube itself; third, means for utilizing the ray as it is produced.

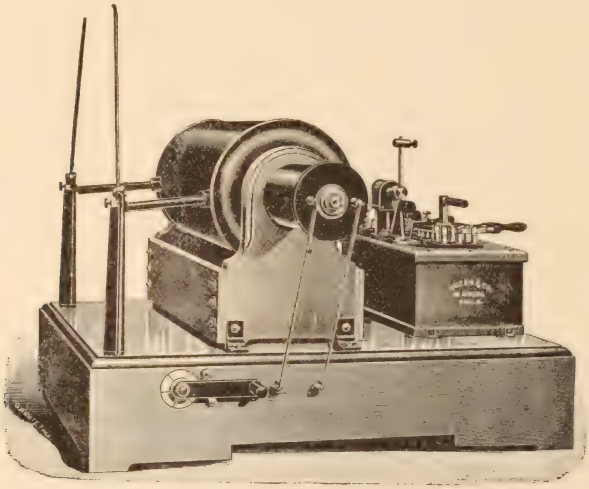
Of the first, there are three kinds of machines suitable for generating the necessary current for exciting the tubes, the one in most general use being the induction coil.

While any coil that will give a spark of four inches or more is capable of producing Roentgen rays, yet there are details in its construction that will render one coil superior to another for this work; and the more powerful the coil the larger the tube that can be used, and the better will be the results obtained.

Thin, weak sparks will not produce results obtained by good, *fat* sparks, as they are called.

Fig. 2 shows to what perfection the Ruhmkorff coil (so called from its designer) has reached, as constructed for Roentgen ray work. This is made by Queen & Co., of Philadelphia, and the one

Fig. 2.



in question is capable of giving a spark fifteen inches in length. The voltage of the current capable of jumping this distance is estimated at 150,000. I say estimated, because this figure is reached by calculation, there being no apparatus capable of measuring such high-tension currents.

This form of induction coil can be constructed so as to be operated either by the ordinary Edison incandescent lamp current or by primary batteries, or by secondary (usually improperly called storage) batteries. Therefore an apparatus of this kind can be obtained to meet almost any conditions of the requirements of the operator.

The well-known static electric machine will also furnish a current suitable for the excitation of the Crookes tube, and as this may be

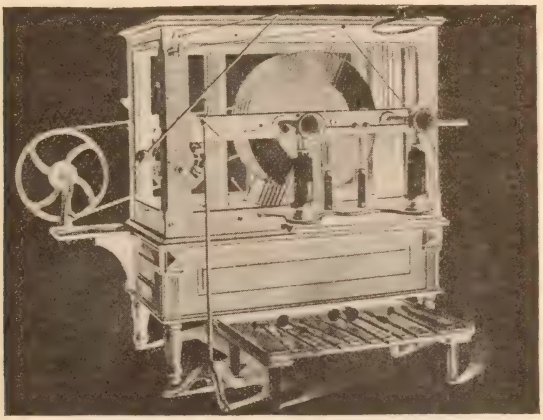
operated by hand power, and is thus self-contained, it has a field for itself.

However, the larger machines should be operated by power, either by an electric or water motor.

There are some objections to this machine, however, which render it not so popular as the others, although it does have its advocates.

Fig. 3 represents the latest type of Ranney-Wimshurst-Holtz machine, made by the Waite & Bartlett Co., of New York.

Fig. 3.



The Tesla coil, bearing the name of its distinguished inventor, a modification of the induction coil, is a most beautiful machine and splendidly adapted to the production of Roentgen rays, and the most powerful effects may be produced by it.

The essential difference between the induction and the Tesla coil lies in the number of discharges emitted by each per second. These in the former are limited by the number of vibrations of the circuit-breaker, which upon ordinary coils never exceeds one hundred per second, while in the Tesla coil this runs up into the tens and hundreds of thousands per second.

By using the Wehnelt interrupter (a very late discovery) upon the induction coil, the discharge then closely resembles that of the Tesla coil when operated at its lowest number of vibrations.

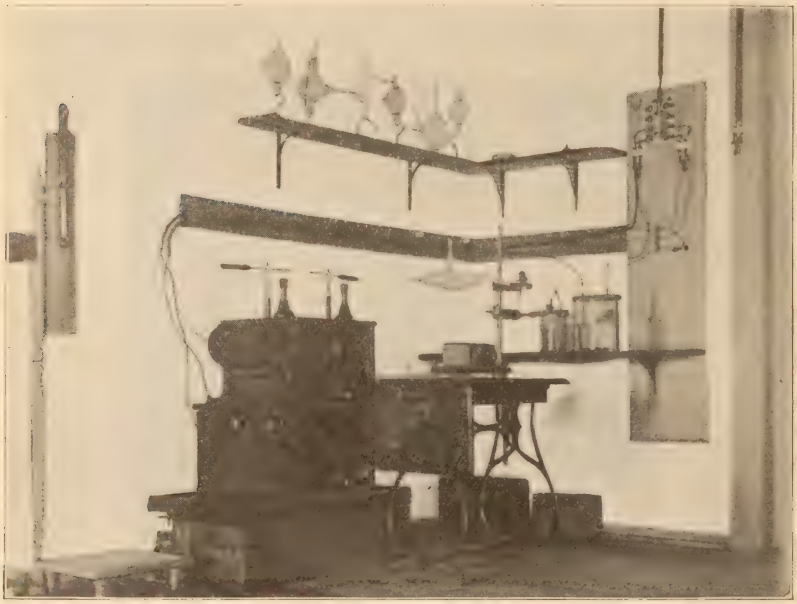
This coil is only furnished to be operated by the direct (Edison)

or the alternating current, so that its use is limited to fields where such may be reached.

The Tesla coil is the form of apparatus that I use.

Fig. 4 shows one corner of my experimental laboratory, with the apparatus ready for use. With the single exception of its non-portability, I believe it has all the advantages of either the induction coil or static machine, and many others which these do not

Fig. 4.



possess. It is always ready for use, and the simple closing of a switch starts the machine. The circuit-breaker is non-complicated, easily regulated by a water rheostat, and the amount of current is therefore under the most perfect control and capable of the most minute regulation; all of which are points of the greatest advantage to the operator. Many most beautiful experiments are also capable of being produced by this apparatus, and it is, in fact, a never-ceasing source of study and of pleasure.

There is no doubt, however, that tubes are more liable to be punctured when used upon a Tesla coil than by either of the other forms of apparatus, and once this occurs the tube becomes instantly

useless, and must be returned to the maker, who may or may not be able to repair it. So far I have yet to find a maker who can account for this, but the loss of many tubes attracted my attention to the subject, with the following results:

The high-tension discharge produced by the Tesla coil is of a decidedly different character from that generated by the ordinary induction coil, and I believe is of infinitely higher potential; therefore it is practically impossible to thoroughly insulate either the tube or wires leading thereto.

While it is generally understood that an alternating current machine has no positive and negative poles, there is some strange and unaccountable (to me) transition in the current as it passes through the Tesla coil, for if there be no difference of potential between the two terminals of this machine, there is at least a striking difference in the manifestations which occur at these two points. Whether it be or be not a difference of potential (which I believe it is), at any rate there is a phenomenon in which we are greatly concerned; as I have been convinced that my tubes were punctured by the discharge leaping from the positive (?) terminal to the tube, and thence to ground.

To overcome this trouble the following was devised: First, the tube stand was insulated from the table by two glass plates separated by porcelain knobs. Next, the positive (?) terminal of the coil was always connected to the terminal of the tube opposite the stem, and the negative (?) wire to the terminal nearest the stem. Next, a stout piece of wire was grounded by a lighter one and placed in such a position that the free extremity was about three-fourths inch away from the terminal near the stem of the tube. In operation, instead of there being the usual play of sparks from the terminal of the tube *toward the glass stem,—the dangerous feature,*—this discharge now takes place *toward* the grounded wire and away from the tube, and thus liability to puncture is avoided. Since this method of prevention was devised I have not lost a tube by puncture, and I would suggest its adoption, or at least trial, to other users of the Tesla coil.

This detail is shown in the illustration.

Having thus tersely described the apparatus necessary for exciting the tube, we next come to the second group, or the tube itself.

Almost immediately upon the announcement by Professor Roent-

gen of his discovery the then present form of tube was found to be inefficient, and its improvement was undertaken at once by many minds. I myself was present when one of the early operators took a skiagraph of a hand in twenty minutes, which was not an unusually long exposure at that time. When I state that this one shown in Fig. 5 was taken in less than one second, or the one-twelve-hundredth part of that time, you will readily recognize what vast

Fig. 5.

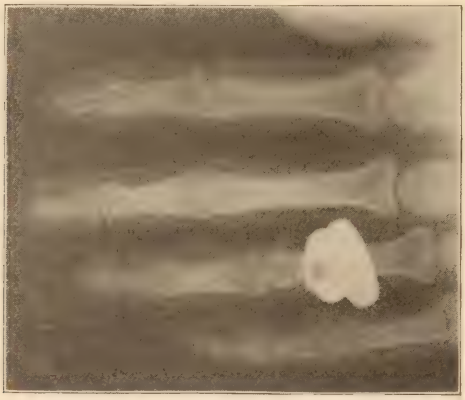


Fig. 6.

improvements in the apparatus and methods of manipulation have been made since then.

While there are many forms of Crookes tubes upon the market to-day, the essential features are the same in all; special differences in details add to their advantages and render some more suitable than others for the different machines for which they are intended.

Fig. 6 represents the usual form of to-day. In this the original concave aluminum cathode is still present, but instead of allowing the rays to cross at their focus and impinge upon the glass walls opposite, which would soon melt in a very highly excited tube, at

this point of focus is placed a flat piece of platinum, upon which the cathode rays impinge and are reflected.

Here the cathode rays terminate and the Roentgen rays originate, but the cause of their origin is still a matter of speculation, and the various theories upon the subject should form no part of this paper. Suffice it to say that the rays do originate at this point.

The advantage of this platinum reflector is that much more powerful currents may be used before the platinum will melt, and therefore stronger rays are produced.

By continued use, the vacuum of a properly exhausted tube will rise until it will eventually reach a degree at which no Roentgen rays can be produced. This is caused by the molecules of air adhering to the glass walls.

Heating the tube by an alcohol flame will drive them off and thus reduce the vacuum, but this is not an altogether satisfactory method, and to overcome this objectionable feature a small auxiliary bulb (as shown) is connected with the tube and partly filled with caustic potash. When the vacuum becomes too high this bulb is carefully heated by an alcohol lamp; a portion of the potash vaporizes, and the vacuum may thus be reduced to the proper degree.

A suggested improvement upon this was the surrounding of this bulb of potash by a fine wire connected to a battery, so proportioned that the wire could be heated by the electric current therefrom, and its temperature regulated by a rheostat, but this has not proved satisfactory in practice.

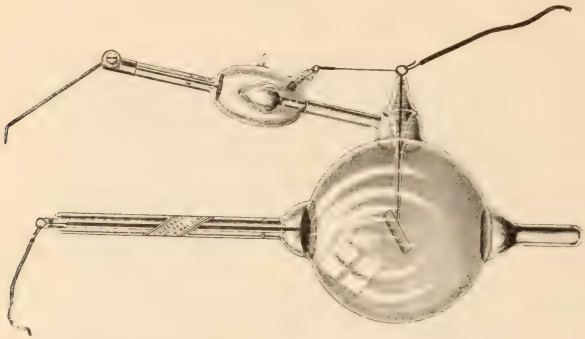
An incandescent lamp attached to the tube was the suggestion of Dr. William J. Morton, but has not been a practical success. Other devices of like purpose have been tried, but the one first mentioned, that of the caustic potash or similar salt in an auxiliary bulb, is, I believe, the method in most general use to-day where the regulating is not automatic. It will be seen at once that this method of regulating, while satisfactory to a certain extent, is not all that is to be desired, and it remained for Messrs. Queen & Co., of Philadelphia, to bring out the first tube capable of automatic regulation, which is shown in Fig. 7.

This is a most beautiful piece of workmanship, and ingenious as well. Here the caustic potash bulb is heated by the current that operates the tube, and by varying the distance between the two terminals of the adjustable spark gap any degree of exhaustion that

is within the limits of the tube can be obtained, and remains practically stable. In this connection it is well to observe that for different purposes a slightly lower or trifle higher vacuum may have its advantages.

It has been found that different degrees of the vacuum give better results for different parts of the body, and a lower vacuum is better

Fig. 7.



adapted to photographic plates than the fluoroscope. Furthermore, it has been found that the best results are only obtained when such an amount of current is put through the tube as to heat the platinum reflector (or anode) intensely. Consequently this is liable to be melted and the tube ruined. Naturally, then, the minds of the workers were set to solve this problem, and with the following results:

Fig. 8.

The tube shown in Fig. 8 has a circular target pivoted in its center, while the point of focus of the cathode rays is near its periphery. Should a hole be melted in the platinum disk, a slight jar will cause the target to rotate slightly, when a new plane surface is brought to focus. Certainly a very ingenious device; but this is only temporary, as it is only a question of time when the target will be used up.

A more effective method is the prevention, rather than the cure.

Fig. 9 shows a Crookes tube with the anode in the shape of a

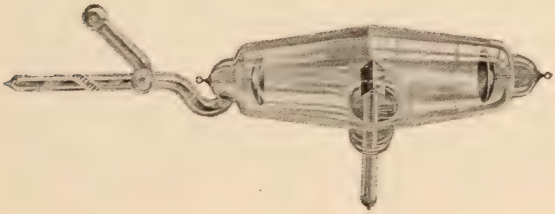
tube within a tube, which allows a stream of water to be constantly impinging upon the back of the target, thereby keeping its temperature down, so that the most powerful generators may be used upon such a tube without danger of melting the platinum.

Both of these latter tubes are made by W. E. Oelling, of Boston.

The tubes so far illustrated have but one cathode disk and a flat platinum reflector, and are devised for use upon the induction coil or static machine. When, however, a Tesla coil is used, the current being alternating, a modification is necessary, as shown in Fig. 10.

Fig. 9.

Fig. 10.



These are called double focus tubes, from their having two focusing disks, or cathodes, to each of which the terminals of the machine are connected, while no connection is made to the reflector, which in this case is V-shaped. While there are other forms of tubes suitable for this coil, this has proved most satisfactory in my hands.

It has been stated by some operators that on account of its construction, with its double focusing point, as fine pictures in the matter of clearness and detail cannot be produced by this as by the single focus form. This I believe to be a mistake, as here is a picture of a mouse (Fig. 11) taken by me in which the detail is absolutely perfect. And another (Fig. 12) of a part of a lower maxillary bone, which I trust speaks for itself. So that I believe that as fine work in regard to detail and shortness of exposure can be produced by the Tesla coil as by any other means.

FIG. 11.

FIG. 12.

We next reach the third classification, or means for utilizing the ray as it is produced.

The Roentgen ray is invisible to the human eye, and can be recognized only by its effects upon objects other than the retina.

You will remember that in describing Professor Roentgen's discovery it was stated that he was led to it by the fluorescence of the paper in his hand. The advantages of the power of fluorescence by this ray, in addition to its action upon a photographic plate, were early appreciated, and led to the invention of the fluoroscope, as it is called.

Fig. 13 shows this instrument, which is so well known as to need no further description other than to say that the platino-barium cyanid has been found to be the best substance for the fluorescent

Fig. 13.

screen; and in its present shape is really the invention of an Italian, Professor E. Salvoni, and which he originally called the cryptoscope. By means of this instrument the fluorescent action of the rays is utilized to its fullest advantage. Its operation is as follows: When held before a properly excited tube the entire surface of the screen, within the fluoroscope, becomes highly fluorescent. If now any body is held between the screen and the tube, a shadow more or less distinct is cast upon the screen. When the hand is held between these the rays penetrate the fleshy parts with ease and the outline is lost to view, but the bones, being more opaque, stand out in bold relief. One does not see through any object by means of the Roentgen ray, but the rays cast the shadow upon the screen; and this only is observed.

Most important is the fact that photographic plates are susceptible to the effects of these rays in question; the result of which is

that any shadow picture that may be seen upon the fluoroscope can be permanently recorded upon a photographic plate.

Manufacturers early experimented with different characters of films for coating plates and celluloid backings for this special work, with the result that they claim that some specially prepared plates possess certain advantages over the ordinary; and I believe for certain classes of work such is the case.

Once the new art of producing pictures of the invisible was accomplished, it became necessary to baptize them with a name. Many were suggested by numerous men of science and others, but those which proved most acceptable were "skiagraph" and "radiograph," both of which are in general use to-day. Sometimes we see skiagram.

A disposition was shown to connect Professor Roentgen's name with the subject, but no really good euphonious word containing his name could be constructed.

Skiagraph, from the Greek, means a shadow picture, and is therefore an appropriate term, as these are distinctly shadow pictures. That "skia" also means "ghost" is hardly an objection, but perhaps renders it more suggestive.

Up to this time the general use of the Roentgen ray has been confined to making fluoroscopic examinations and skiagraphs of the human body. For many purposes a visual examination is all that is necessary, but for others it is essential to obtain a picture of the object of interest.

The use of the Roentgen ray in dentistry is of the utmost value, as it will reveal certain conditions that obtain within the alveolar process that are positively unobtainable by any other means. In cases of unerupted teeth it removes our work from the realm of guesswork into that of exact knowledge, and is now indispensable in the practice of orthodontia. The locating of broken roots and ascertaining to a certain extent their shape is frequently of great value. A skiagraph of a partly erupted or encysted third molar, showing the general position of its roots, is invaluable in many cases. The examination of the roots of replanted and implanted teeth, and their surrounding tissues, opens up a most interesting field for study. While a small fluoroscope screen, as suggested by Dr. Rollins, of Boston, may be arranged so as to obtain a view of some of the roots of the posterior teeth, I am confident that such a

method would not prove as satisfactory as obtaining a skiagraph, and I therefore have never experimented in that line.

To obtain a good skiagraph certain elements are essential, which are, first, necessarily a powerful generator, that the length of exposure may be reduced to the minimum; second, a photographic plate or film best adapted to the Roentgen ray, and, third, it is necessary to have the plate held perfectly still in its position, as close to the object to be skiagraphed as possible, and at the same time the plate should lie perfectly horizontal with the object, and both at right angles to the source of the rays.

Now, while this is perfectly feasible with some portions of the body, say the hand, leg, or arm, and therefore perfect shadow pictures of these parts are obtained, it is not always so with the teeth, from the nature of their position, and therefore such perfect results are not always obtainable in our special department. It is possible usually to place the properly cut photograph plate or film on a plane with the lower molars and bicuspids, and sometimes with the upper molars, especially when the vault is high; and under these conditions splendid results are obtained. But when it comes to the teeth anterior to these the horizontal curvature of the maxillary bones, added to the arch of the roof of the mouth in the upper jaw, renders this impossible, and consequently in these instances pictures more or less distorted are the best that can be obtained.

As before stated, one of the requirements in obtaining a skiagraph is that the object to be pictured and the plate or film must be held perfectly still during the process. It is frequently possible to cut the film of the proper shape, inclose it in a black (light proof) envelope, and allow the patient to hold it in the mouth in the desired position; but upon general principles this is not satisfactory, more especially with children, as it is liable to be moved during the exposure.

The method that I now use, after much experimenting in that line, is as follows:

A cast is made of the portion of the mouth to be skiagraphed, and a small piece of modeling compound molded over the crowns of the teeth thereon. A piece of aluminum, this metal being almost transparent to the rays, of about 26 or 28 gauge, is cut to the desired size and shape and bent to fit the cast as well as possible. This is slotted along the edge toward the crowns of the teeth, and thereby at-

tached to the modeling compound above referred to. This forms a convenient little film-holder, which when placed in the mouth will allow the patient to close the teeth upon it, and thus hold it securely in position, without danger of its moving, for a much longer time than is necessary to take the picture.

The next step is to cut the plate or celluloid film, whichever is to be used, to the proper size and envelop it neatly in black paper, glueing down all the edges with paste and securing it to the plate-holder by two or more small aluminum clamps.

This is all that is usually necessary, but if it is deemed advisable to protect this from moisture, as sometimes is the case, more especially for lower teeth, then the black envelope is covered with thin tin foil or waterproof paper neatly pasted down, care being taken not to have the foil, if that is used, doubled upon the side to be exposed. While this may appear to be a long process, it is quickly accomplished, and the invariably satisfactory results obtained warrant the trouble taken.

The patient is then seated in a chair with a photographer's head-rest to hold the head, the Tesla screen, to be described later, put in place, the tube brought to about ten or twelve inches from the face and placed so as to throw the best shadow of the parts upon the film. The length of exposure depends upon the thickness of the parts to be penetrated, the working condition of the apparatus, and the distance of the patient from the tube, the time being proportional to the square of the distance.

From sixty to ninety seconds are necessary for ordinary cases, ranging perhaps up to one hundred and twenty seconds for third molars in heavy jaws, while twenty to forty seconds are sufficient for some favorable cases in thinner bones.

Fig. 14 shows a case in practice of an unerupted bicuspid taken in forty seconds. Fig. 15 shows a case of normal teeth taken in twenty seconds, and Figs. 16 to 22 show cases from practice.

We must bear in mind that obtaining a skiagraph of the teeth is particularly difficult, because we are seeking to obtain shadows of the roots, which are only slightly more opaque to the rays than the bone in which they are found. Herein lies the difficulty; not in obtaining rays that will penetrate the bone, but in the fact that in relatively thick bony tissue the slightly more opaque root, especially toward its attenuated apex, is lost in its dense surroundings, so that

for this reason it is sometimes impossible to obtain satisfactory pictures of the ends of the roots we are seeking. Again, for these reasons, the results obtained may at times be very faint and difficult

FIG. 14.

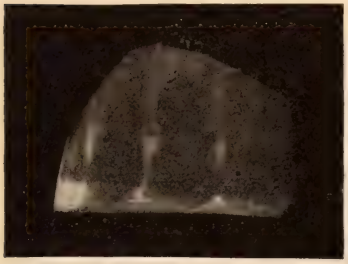


FIG. 15.

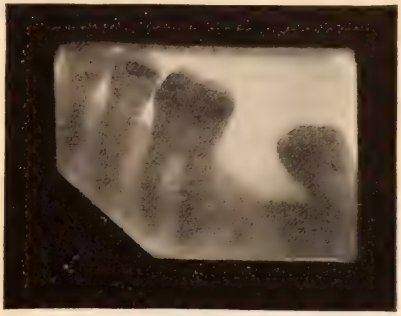


FIG. 16.

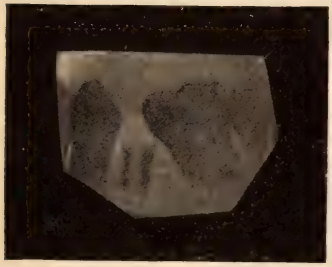


FIG. 17.

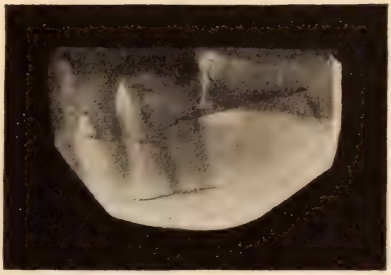


FIG. 18.

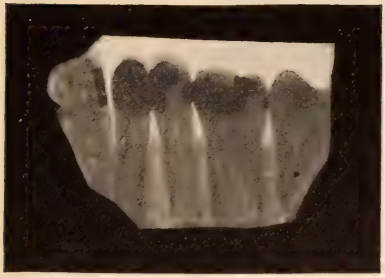
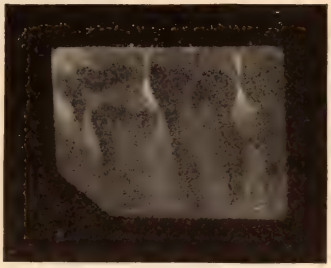


FIG. 19.



to determine, but even under these circumstances they may be of very great benefit.

As the rays penetrate the celluloid films or glass plates with but

little loss of power, several may be superimposed, the one upon the other, and thus two or more pictures obtained at the same time.

Bromide paper may also be used for this purpose instead of the photographic plate or film, but it is not usually as advantageous.

Much has been written and heard of burns or loss of hair being caused subjects who were exposed to these rays. This was probably due to the long exposures to which patients were subjected, sometimes a person being kept under its influence from two to four

FIG. 20.

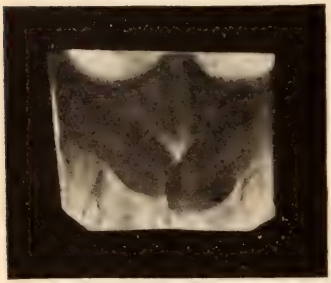


FIG. 21.

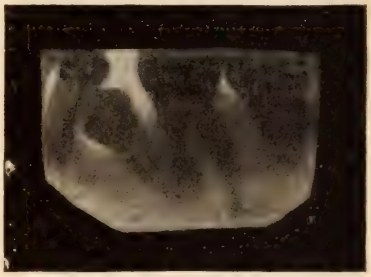
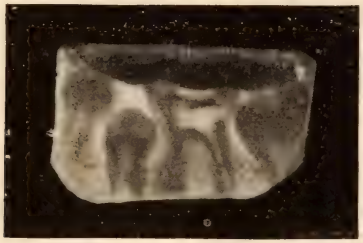


FIG. 22.



hours for the purpose of obtaining a skiagraph of the hip or abdomen. Of late, however, we do not hear so much of these bad effects, and, personally, I have never had any in my experience.

The probable cause of this trouble is still a matter of conjecture, some claiming that they are infectious sores, being caused by the rays carrying into the skin any infectious matter that might be upon the surface; and, according to this, the free application of soap and water previous to an exposure would prevent any unpleasant results. On the other hand, Mr. Tesla and others believe

it is caused by static electricity, and he proposed the use of an aluminum screen between the tube and the subject, with this screen grounded. In this manner the injurious static discharge is collected upon the metal screen and diverted to the ground, while the Roentgen rays pass through with imperceptible interference.

Not having had any experience with these injurious effects, I am consequently unable to form an opinion upon the subject, considering it a wise precaution, however, to see that the exposed surfaces are clean, and to also use the Tesla screen.

SECTION III.

Operative Dentistry.

Report of the Section.

To the President and Members of the National Dental Association: Section III would report that we have held three meetings, and that the following papers of general interest were submitted and ordered read to the general body: Paper on "Porcelain Enamel Inlays," by Dr. N. S. Jenkins, Dresden, Germany; paper on "Susceptibility and Immunity to Dental Caries," by Dr. G. V. Black, Chicago; paper on "A Résumé of the Practice of Dentistry in the Last Thirty-five Years," by Dr. J. N. Crouse, Chicago; paper on "The Management of Children's Teeth," by Dr. C. N. Johnson, Chicago; paper on "Cements," by Dr. E. K. Wedelstaedt, St. Paul, Minn.; paper on "Some Phases of the Cement Question," by Dr. W. V-B. Ames, Chicago.

The following papers were read and ordered turned over to your Publication Committee for publication: Paper on "Choice of Filling-Materials for Specific Conditions of Teeth Ranging between Eight and Eighteen Years of Age," by Dr. S. B. Palmer, Syracuse, N. Y.

The following officers were elected for the next year: Dr. Thomas E. Weeks, Minneapolis, Minn., Chairman; Dr. John I. Hart, New York, Secretary.

J. Y. Crawford, *Chairman;*
Frank Holland, *Secretary.*

To the Chairman and Members of Section III, of the National Dental Association:

Gentlemen,—Your committee appointed to report on a method of conducting the business of the Section beg leave to suggest the adoption of the following rules for guidance:

First. In order to receive consideration, papers or a synopsis must be in the hands of the Secretary of the Section not later than two weeks before the meeting of the National Dental Association.

Second. A committee composed of the Chairman, Secretary, and one other member appointed by the Chair, shall decide which papers shall be presented for consideration, and all rejected papers shall be returned to the authors thereof.

Third. This committee is empowered to select any papers they deem of sufficient interest for presentation to the National Dental Association without previous presentation to the Section.

Fourth. Selection of other papers for presentation to the National Dental Association will be made from those presented to the Section, by a vote of the members of the Section.

Fifth. No discussion will be held on papers read before the Section until those to be presented to the National Dental Association have been selected. Those not so selected will then be generally discussed.

Respectfully submitted,

THOS. E. WEEKS,
C. N. JOHNSON,
GEO. E. HUNT,
Committee.

SECTION III.—Continued.

Porcelain Enamel Inlays.

VOLUNTARY PAPER BY N. S. JENKINS, OF DRESDEN, GERMANY.

THE process and the material which I have the honor to present to you are the result of seven years of study and experiment. The evolution has progressed, through its various stages, by having the work of the laboratory at once tried in the mouth. Scientific experiment and practical application have gone hand in hand, each supplementing, criticising, enlightening the other. More than two years ago the constituents of the body were definitely settled, and since that time a considerable number of the foremost dentists in the world have used this process, in their daily practice, with results similar to those I have myself obtained. I feel therefore justified in announcing to this distinguished Association that the problem of making, with mathematical accuracy and scientific certainty, absolutely perfect fillings in diseased teeth has been completely solved.

Doubtless we shall all agree as to what constitutes a perfect filling. It must fill the cavity so exactly as to exclude moisture. It must be of a substance which will not disintegrate nor change its original form either through chemical action or mechanical force. It must have a surface so smooth that it can easily be kept clean. It must be a poor conductor of caloric. It must restore the color and shape of the teeth. It must be applicable to the most desperate cases and must be susceptible of being used without too great a strain upon timid children and delicate invalids, as well as upon ordinary patients, and its working must not make too great drafts upon the strength and nerves of the operator. Last of all, it must be possible for any good dentist to use it with the certainty

of obtaining infallible results. All these qualities are possessed by the material which I have called Porcelain Enamel.

At the outset I was convinced of the necessity of obtaining a substance which could be melted in a gold foil matrix. It is quite true that skillful men often obtain splendid results, in favorable positions, with properly annealed platinum; but my object was to find a process and a material which could be used successfully, by any competent dentist, in cavities in any part of the mouth, not as an unusual operation, but as an ordinary and regular proceeding in daily practice. With gold foil alone would this be practicable. Any capable man can certainly learn how to approach and how to shape a cavity in any position, so as to get a perfect impression in gold foil, but it will be only a most exceptionably gifted and patient man who can obtain such results everywhere with platinum foil, owing to the intractability of this otherwise most useful metal.

A perfect impression is the indispensable foundation of a perfect inlay. Gold foil No. 30 seems best adapted to the great majority of cavities. It is so thin that wrinkles can be easily obliterated, and yet stiff enough to admit of being worked out, in nearly all cases, without danger of bending or losing its shape. In very large and complicated cavities No. 40 may, however, sometimes be used with advantage. Given the gold foil impression it was necessary to find a simple and reliable method of keeping it exact during fusing. A paste of powdered asbestos and water was found to be quite strong enough to hold the impression in its place in the melting pan. In drying the asbestos, however, which may be done simultaneously with the first fusing, the moisture should be gently evaporated and not violently boiled out by suddenly applied heat.

My experiments began when the electric furnace was not in its present practical condition nor in such general use, and I found it necessary and, indeed, in many ways more convenient to use the heat of gas for fusing. A simple heater, lined with asbestos, open at one side and with a round opening at the bottom and a platinum cup and cover of a definite size, was found to be well adapted to the purpose. Through an opening in the cover of the platinum cup the process of fusing could be observed, a matter of consequence, especially in contouring. The best bellows for the blow-pipe I found to be the so-called Standing bellows, for, by its means, the necessary steadiness of the draft could be obtained.

All these details, while important, were easily and naturally evolved, but the composition of the material itself was a matter of far greater difficulty.

At first I had great hopes of obtaining my aim with glass, after the manner suggested by Herbst, Richter, and others, in spite of the evidence that this seductive and treacherous substance would disintegrate in a warm, moist environment, such as the mouth affords, and it was only by repeated failures that I was led to seek and find the happy combination of ingredients which unites the essential qualities of both porcelain and enamel. In this long search I had the frequent aid of some of the first chemists and practical experts in ceramic art, and my discovery, such as it is, was founded upon the labors of many far more able investigators.

Porcelain enamel has sufficient strength to withstand the force of mastication, and a surface which resists all chemical action except that of hydrofluoric acid. It resembles the substance of English porcelain teeth in many respects, but it fuses at a temperature of between 800° and 900° C., the melting point of gold being, according to the most recent authorities, 1075° C. This difference is quite sufficient to prevent melting the gold matrix, except through great carelessness. The variation of the melting point is also sufficient to prevent the gold foil from adhering to the porcelain enamel, it being easy enough, with a little practice, to strip off the gold in one piece, or to scratch away any fragments which may inadvertently remain attached to the inlay.

By the perfect removal of this perfectly exact thickness of the matrix from the inlay, the latter naturally fits the cavity exactly, and should not rock under pressure nor show a line visible to the naked eye between the inlay and the edges of the cavity.

With such an absolute fit only a slight film of cement is necessary for retaining the filling, but it is important that the inlay should be grooved with a small diamond disk before being set, and also that the cavity should receive some slight undercuts. Under such conditions the color or opacity of the phosphate cement is a matter of trifling importance. A little cement will cling for a time to the joint, and, until it dissolves, there will be a slight barrier to complete harmony of color; but it is so slight, in most cases, as to be noticeable only under dryness and with a magnifying glass. After a time the color of all perfect inlays seems to improve, owing,

perhaps, chiefly to the disappearance of the slight overflow of cement, which it is usually unwise to attempt to completely remove by mechanical means.

Many objections have been raised to using phosphate of zinc for setting inlays, but I know of no such objections which are well founded. Properly used it accomplishes its purpose so well that I can see little necessity for seeking for a substitute. If the inlay fails, it is always owing to some fault in manipulation and not to any defect inherent in zinc phosphate cement. If the inlay fits, as it should, the cement will no more dissolve out than under a gold filling, and with the lapse of time it becomes so hard that its removal is a matter of considerable difficulty. In my earlier experiments I used some materials which caused the inlays to discolor in the mouth, and wherever I find such a case I induce the patient, whenever possible, to have the old inlay removed and replace it with one of the perfected material; but it is an operation to be dreaded, since the old filling is almost invariably very firmly attached by the cement, which, quite as invariably, retains its color as well as its consistence.

I have no faith in the theory that pulps die under the deleterious influence of phosphoric acid. When I first came to Germany, thirty-three years ago, I found the native dentists, who were, at that time, as a class, far less well educated and capable than is now the case, using a great amount of phosphate where an American dentist would naturally employ gold. There came to me a large number of cases where the pulp had died under such fillings, but I cannot remember ever to have seen a single instance where there was not evidence that the phosphate had either been placed over an exposed pulp or else the ordinary precautions of cleanliness and thoroughness had been disregarded. In using phosphate cement in setting inlays where there remains only a thin layer of soft dentin over the pulp, it is well to saturate the cavity with carbolic acid, which can be dried out after a few minutes, when the pulp will be found far less sensitive to the irritating action of the phosphoric acid; but, even when this precaution has not been taken, I have never known a pulp to suffer more than a few hours' discomfort from the use of phosphate cement. Usually a cement with a very fine powder and one which does not suddenly crystallize is to be preferred.

The melting of the inlay requires intelligent care, like every other step of the process. The powder should be mixed with absolute alcohol, both for convenience of working and because it evaporates with less disturbance of the particles than water, as well as because there is no danger of its conveying any deleterious substance, as lead for instance, in solution. The powder works so kindly with alcohol that one can pack and melt to the finest edge, or obtain any contour which may be desired, with the greatest certainty. A good eye for form and color is necessary. After a little practice one should be able to exactly reproduce the form of the missing portion of the tooth so as to make unnecessary any shaping of the inlay by grinding.

The selection of the color is often a matter of difficulty. Especially in small inlays it is well to choose a color slightly darker than the tooth in a moist condition, except in approximal cavities, where a lighter color is often indicated. Selecting the color after the tooth has been dried under the rubber-dam is misleading. The inlay must correspond in color to the tooth in its natural, moist condition, and then, in a few weeks after being set, the tooth will have the same appearance as it presents when the inlay is tried in and before it is set in cement, so both operator and patient can know to a certainty, before the filling is set, what its permanent appearance is to be.

When a cavity has been prepared for a gold filling, if the operator at the last moment changes his plan and decides to insert an inlay, he will often be surprised to find, upon reshaping the cavity and giving it straight or flaring walls and obliterating undercuts, that he had left, in the first instance, some minute particles of decay or softened dentin which, under the less free opening designed for the gold filling, had escaped his observation. You have all felt the chagrin which occasionally comes to every dentist at discoloration under a mechanically perfect gold filling, but such an annoyance, for the above as well as for other reasons, is not attendant upon inlay work.

To be sure, the operator, in the beginning at least, must be prepared to give this work more time, cavity for cavity, than is necessary to his more accustomed method of gold filling, but he will find the work less exhausting, more remunerative, and far more satisfactory. Last of all, if the testimony of the patient is to be ac-

cepted, inlay work is incomparably more merciful. Nearly all patients who are not insensible to pain and physical discomfort declare, having once experienced the difference between the two methods, that they will never again submit to the torture of the mallet and the sensitiveness to changes of temperature which accompany gold work in any case where an inlay is practicable, and its practicability is almost universal.

Porcelain enamel has a wide field of usefulness in crowns and pivot teeth. It adheres fairly well to platinum, but, of course, in building up crowns it should usually have some support from pins also. The most beautiful work can be done with its aid in pivot teeth, and where roots are banded the visible portion of the band can be covered, to great advantage, either with gum color or with the color of the tooth itself. In melting upon porcelain teeth, however, care should be taken to melt the porcelain enamel gently and only just sufficiently to accomplish the purpose, that the expansion should be as slight as possible. This precaution, and slowness in cooling also, are only necessary when American teeth are used. Porcelain enamel has a far greater affinity for English teeth, to which it attaches itself so naturally that there is little fear of cracking in cooling. By its means the color of a pivot tooth can be perfectly preserved, or, if desirable, a slight lightening or darkening of the shade of the tooth can be easily obtained.

The process of manufacture is a complicated and difficult one, so that the material is relatively expensive, but its original cost is a matter of no consequence in comparison to its usefulness. Arrangements have been made to supply the American demand, and I feel confident that all of you who adopt this method will find it as advantageous to yourselves as it will surely be to your grateful patients.

DISCUSSION.

Dr. John I. Hart: I am impressed with the idea that this Association is deeply indebted to Dr. Jenkins for the presentation of the essay to which we have just listened, in which he has given us the result of his labors. I think that the interest manifested in this class of work is a refutation of the ideas expressed in the discussion at the last session,—that we are drifting toward commercialism and that we lack esthetic refinement.

While it is true that we have made a study of porcelain for some

years past in a desultory fashion, it is entirely due to Dr. Jenkins that the present interest in this class of work has been stimulated. Personally, I prefer a higher-fusing body than that made use of by Dr. Jenkins, but the detail of the operation has surely been perfected by him. It is essential, in using the higher-fusing body as indicated in the essay, that we make use of platinum as a matrix. If the platinum was properly annealed, I have not encountered the difficulty indicated in the paper in carrying it to the base of the cavity. By using the platinum as a matrix, one is enabled to try in the inlay, and, if sufficient contour has not been provided for, to add to the inlay without reinvesting. This is impracticable under the method explained by the essayist.

I have found the carrying of the platinum into deep cavities simplified by a method which I shall describe, which has probably suggested itself to many of those present, but which may prove useful to some others.

Having prepared the cavity, take an impression of the tooth and cavity with modelling compound, chilling the same with ice, so as to get as definite margins as possible. Pour into the impression the oxyphosphate of zinc and allow the same to crystallize. Then separate, and we have a replica of the tooth and cavity in the oxyphosphate of zinc which will stand the burnishing of the platinum far better than would the plaster of Paris. Having burnished the platinum into the cavity, in the impression, and well over the margins, then pack the body into the cavity about two-thirds full. This is removed and fused. This, after it is cooled, is carried to the cavity in the tooth and pressed home, and the platinum thoroughly burnished over the margins. In this way we can try in the piece, and get thorough adaptation of the platinum with much greater facility than if we attempt to burnish it into the tooth originally. After removing the platinum I think it is distinctly advantageous to make use of the hydrofluoric acid on the surface which rests next to the tooth, which is held in place by the oxyphosphate of zinc, so that we get a roughened surface, and in that way get a better hold of the inlay, so that there is less danger of its being forced out under the stress of mastication.

The method which I describe—of taking an impression of the cavity—I would only consider indicated where the cavity was extensive and more than one surface was involved.

Dr. E. T. Darby: There is perhaps no subject engaging the attention of the profession at the present time with more intensity of interest than this matter of porcelain inlays. I do not rise to say anything new upon the subject, but rather to indorse the methods suggested by Dr. Jenkins. It was my privilege two years ago this summer, through his courtesy and kindness, to spend a week or more with him at his home in Dresden. While there I had ample opportunities for observing his methods, and saw the beautiful and artistic way in which he performed these operations. I also had the opportunity of witnessing operations which he had performed months, and even years, previously. To say that I was charmed with the results which he produced is to say but one-half that I experienced. I was amazed—I was gratified beyond description—to see with what beauty and with what accuracy of fit and harmony of color he produced results. I have never seen anything in the way of operative dentistry that suited me so well. Many of those operations were faultless in color, and were faultless in fit so far as the naked eye could discern, and at a distance of twelve inches from the mouth of the patient I could not detect the line of contact between the porcelain and the tooth.

Through his generosity, I brought with me from Germany a complete outfit, which has enabled me to make these inlays. In my earlier experiments I found that I had some difficulty in making what I considered a perfect inlay; but, as in everything else, experience made perfect, and after a little practice I found that I could produce results that were exceedingly gratifying to me, even inexperienced as I was. The longer I have experimented with this method, the more care I have taken in the performance of the various steps in its progress, the more certain have I become that it is one of the greatest blessings to the dental profession, one of the most satisfactory things to the community at large, and that it is destined to prove one of the greatest improvements in dental practice. It is not a thing for the careless man to undertake. It requires care in every detail; but there is not a man present to-day who is competent to practice dentistry who cannot, with a very little experience and painstaking effort, produce results that will be eminently satisfactory to him and absolutely satisfactory to his patients. Therefore, gentlemen, I commend to you in the heartiest and most emphatic way possible the beauty, the sim-

plicity, the artistic character of the work which Dr. Jenkins has described.

Dr. C. N. Johnson: Lest this matter may seem to go all one way, I should like to say a word or two. I must first compliment Dr. Jenkins. I feel personally indebted to him for coming so far and reading this paper. It is a clear-cut, well-defined paper, easily understood, and I have nothing but praise for the presentation of the subject; but I want to throw out just one word of caution.

In one place in the paper the intimation was made, as I understood it, that this method could be easily practiced or readily comprehended by the average practitioner. If I know anything about inlay work at all, it seems to me that of all work that we are to do in operative dentistry there is nothing that requires such accuracy of attention to details in every particular as the performance of that work, and the reason I arise is to caution the profession about running too thoughtlessly after this innovation, without due contemplation of what they are undertaking.

Inlay work is not new to the members of the profession in the United States. It was introduced years ago, and I think I will be corroborated by the older practitioners who have been observant when I say that inlay work in the United States has done a very great deal of injury and has brought much reflection upon the profession; not because, possibly, of its inherent defects, but because of the fact that in order that it may be done to the best advantage the requirements are so severe, the details so intricate, that the average practitioner, without due study, is not likely to perform that work successfully.

I was impressed in just one other particular by the remarks of Dr. Hart when he outlined so beautifully the method of making that inlay, and I felt that by the time he got the cavity prepared, and the matrix made and the inlay fused, an operator of average ability would have had the filling of gold inserted. And I feel, gentlemen, that when you take gold foil and understand how it is to be manipulated, and place it against the wall of dentin or the wall of enamel, in perfect contact as it can be, it is going to remain there. There is not going to be a leak at the joint. There is no danger of the cement dissolving out, as there may be in inlays not properly constructed. And so in the large number of cases, while I deplore as much as any one the showing of gold in the anterior

part of the mouth, yet so far as the utility of the operation is concerned I shall still give my preference to gold filling.

Dr. Head: A French lady, speaking to a well-known New York dentist concerning a defective front tooth, said, "I cannot have it filled here, because you will put gold in front teeth. I want white filling." But the dentist said, "I can put white filling, only gold is so much more permanent." "Yes," she answered, "but over in France we would rather be temporarily beautiful than permanently ugly." The fact whether porcelain inlays will last or will not last is not open to discussion, because we know that they have lasted. We know that even the old porous glass fillings, that tended to turn dark from the action of the saliva, lasted from eight to ten years, and, as far as the edges are concerned, showed signs of being able to last eight or ten years longer.

Therefore I am not here to defend the durability of porcelain fillings. I am not here to defend the fact that some dentists may be able to do better work than others; but I do affirm that any dentist who is capable of putting in a good gold filling has sufficient mechanical ability to learn to put in a good porcelain filling.

In the profession of dentistry, some operators put in better gold fillings than others. We have even heard it said that with the work of the average operator the average life of a gold filling is not over five years, and even with good operators I have sometimes seen fillings, average fillings, which made me doubt that the average life was so long as five years. Porcelain work is not easy, and those who attempt it have the same disappointments and sorrows that awaited them when they started to learn the art of gold filling.

But now I should like to discuss some special points of porcelain work. I admire Dr. Jenkins's operations exceedingly, and any good operator can obtain excellent results by his system; but low-fusing porcelain has heretofore been found unsatisfactory, and for this reason the Jenkins porcelain is at present only on trial. On the other hand, we have an easily worked, high-fusing body of consistence and strength equal to continuous gum, that has been used for the last twenty or thirty years without showing any deterioration in the mouth, and it seems unwise to turn from an old friend and take up a new and untried friend, however beautiful that new and untried friend may appear.

As I understand Dr. Jenkins's system, the gold matrix is made from the finished cavity, and then placed upon asbestos and the porcelain flowed in, thus allowing the porcelain when it is hot to contract in the matrix and run the risk of causing distortion, which would naturally arise from the unequal expansion and contraction of the porcelain and the metal. On the other hand, where the bare platinum matrix is used, the matrix is burnished into the cavity and the porcelain is fused into it almost up to the edges. The matrix with the fused porcelain is then replaced in the cavity exactly in its former position, and the edges are burnished down a second time when the finishing porcclain is added. This second burnishing makes it possible to do away with the distortion caused by the unequal expansion of the porcelain and the metal, and makes the final edges almost perfect. With the simple circular cavities the single burnishing is ample, and is in many instances all that those in America use; but where one has to fill a cavity with compound curves on approximal surfaces, the expansion and contraction are apt to throw the edges out of line. And observation of such fillings made by the Jenkins system has confirmed the force of this objection; but this objection does not, of necessity, hold against the use of the Jenkins porcelain. As Dr. Jenkins has said, a second burnishing is quite possible if the operator so desire, and that brings us down to the point as to whether the low-fusing or the high-fusing material is the better of the two. The principal point involved is whether equally good adaptation can be obtained with thin platinum as with thin gold. If the platinum is badly treated, if it is not annealed in a furnace where no gas can reach it, the platinum will be hard; but if a platinum foil one-one-thousandth of an inch in thickness is annealed properly it will be found to be almost as soft as lead. If this platinum is placed over the cavity, pushed in with cotton or bibulous paper as far as possible, and then while immovable is carefully burnished into place with a steady circular motion, I think the ordinary operator will have no difficulty in obtaining a perfect matrix.

So the two systems are before you, gentlemen. Naturally, I cannot speak to you from an unbiased point of view, as I am an advocate of the high-fusing material and the platinum matrix; but I wish especially to emphasize the fact that in the use of porcelain by either method it is the mechanical skill and care of

the operator which will give good results, and without that care and skill good results cannot be obtained by either method. But given an equal amount of skill and care, in my opinion the high-fusing porcelain and the platinum matrix will in the long run result in the greater number of successes.

Dr. George Evans, New York City: I recently procured from Dr. Jenkins a set of his porcelain enamel or inlay material. I have not as yet had much opportunity to use it for inlays, but I wish to report some experiments I made with gold crowns. I find that seamless crowns made of pure gold or gold slightly alloyed with a small percentage of platinum can be enameled with Dr. Jenkins's porcelain. The gold crown is first fitted to the tooth and the grinding-surface, then thickened by scratching the inside surface of the gold cusps and packing on the roughened surface freshly annealed pellets of gold foil, which adhere to the gold, and next thoroughly condensing with revolving agate points. The exposed labial surface of the gold is then ground thin, pressed in against the surface of the natural tooth, and punctured. The proper shade of porcelain body is placed on the depressed section and fused in the same manner as an inlay. I have also succeeded in another method: I take an S. S. White Dental Manufacturing Company tooth that corresponds in size and color with the other teeth, remove the pins, and grind the tooth down thin until there is nothing left but the mere front of the porcelain. I attach this front with Dr. Jenkins's porcelain body to the gold crown, and, judged from an esthetic point, get a result which will be a great advantage in this country where so many gold crowns are used. I have some specimens here, and will show them to you at the clinic this afternoon. At the same time I will demonstrate the cementation of bridge-work with gutta-percha. I am very much interested in this branch of porcelain work, and have carefully considered the respective merits of high and low-fusing bodies. I will acknowledge that until recently I was prejudiced against anything you might designate a low-fusing body; but when I saw some of the results obtained by Dr. Jenkins at the New Jersey State Dental Association, at Asbury Park, last month, and the close joint he made to the margins of the cavity, I was immediately convinced he had an advantage to some extent over the high-fusing porcelain. Merits that we have to consider regarding a porce-

lain inlay are close fit to the margins of the cavity, strength, and appearance. Dr. Jenkins's porcelain seems to possess these.

As to durability, I cannot speak on that. We have to depend on the statements of Dr. Jenkins, and also Dr. Darby, who has had quite an experience in its use and presented the subject at the New York Odontological Society over a year ago.

Dr. McKellops: I have only a few words to say, not on porcelain work, because that is not my hobby; while, as you all understand, gold work is. But what I want to contend is that when the profession get down to the practice of using platinum-gold for front cavities, there is nothing in the way of porcelain work or anything else that can touch it. I can build work that will wear as well as any porcelain work you ever saw, and at the distance of this gentleman from me you can hardly discover it. There is perfect work. There is work that you cannot wear. You may put it in the mouth of a man who has the most powerful jaws, you may put it into molar teeth, and he cannot wear it out or wear it down, if it is properly done. Why is it that the profession sleeps and lets this thing go by in this manner, when it has been explained to them year after year that you can accomplish such good results? I have traveled this wide world over and I do not see it used, and in spite of my age I am willing to let any man put in porcelain work against what I will put in in platinum fillings in front teeth, and I will accomplish it with more ease and with as great comfort to my patients as they can get with the putting in of porcelain work. Porcelain work is all very well, but when I want durable work and fine work give me platinum-gold. It does not show, it gives the execution and everything that the profession wants and the patient wants, and gives as much satisfaction as any man could possibly give. Of course, it requires a little skill and a little ingenuity of the hand to accomplish these things; but when you accomplish it look at the results you get. But you are afraid to work it. It requires a little skill, but you can accomplish the best results and get more satisfaction than with anything else.

Dr. Ottolengui: It seems to me that discussion is futile where we do not reach finality. This matter of porcelain work has been discussed now at several meetings where I have been present, and identically the same things have been iterated and reiterated on both sides, while the real issue, as it appears to me, has been some-

what clouded, and the disciples of one side or the other have gone away, unconvinced themselves and not having convinced their hearers. It seems to me that there is an opportunity here to settle this matter. The point at issue is whether we shall use a low-fusing body in a gold matrix or a high-fusing body in a platinum matrix. We are told by the platinum disciples that they can return to the cavity and burnish a second time, and that they can overcome the shrinkage. I think it was Dr. Hart who told us that we cannot do that with gold. Dr. Head is coming around, because he has at last admitted that the other side claim they can do so.

We hear a great deal from the platinum gentlemen about the use of an investment. Now, I wish to assert that in any cavity of which a gold matrix can be taken the result can be reached without any investment, and without any shrinkage which will affect the fit, and that the necessity for a second burnishing only maintains with the platinum because you do not, in deep cavities, get that perfection of edge with the platinum which is requisite, and because the gentlemen who are using the platinum, dealing with a material which will stand a high degree of heat, expect to get, and do get, their results with one, two, or three bakings; whereas those of us who desire a more accurate fit and a thinner matrix, as we obtain with gold, are satisfied to get a result after five, ten, or fifteen bakings.

I wish to say that before I left home, as a test of this matter, which was brought up at Asbury Park, I took a molar tooth from which I removed an amalgam filling which occupied the posterior, anterior, and occlusal surfaces, thus leaving nothing but the buccal and palatal walls, and extending down into the pulp-chamber, and that I made for a cavity a filling with the Jenkins method, using No. 30 rolled foil, and placed a satisfactory filling; whereas it has not been demonstrated that that can be done with platinum. I understand that Dr. Jenkins has a cavity here of this deep character, and I wish to suggest that these two gentlemen make their fillings for the same cavity, and permit us to see whether or not with platinum we get as good or better results than with gold, and then let us stop talking about it.

Dr. Jenkins: I wish to express my thanks to the Association for the courteous, kind, and generous manner in which it has received me, and to express my obligations to the gentlemen who

have spoken upon this subject for the clear, kind, and very instructive manner in which they have spoken upon it.

I would only reply in one word to Dr. Hart, by saying that I fear that I have not made sufficiently plain that the claim I wished to make for what is called my method is its simplicity. There is no question that by the methods which have been suggested great results can be obtained, but why take so much trouble and expend so much time when it can be done with yet greater certainty in a simpler way?

There is no danger whatever, after such a matrix has been placed in its asbestos bed and subjected to heat at any temperature, that this material will crawl or contract or draw together the edges of the matrix. It remains absolutely fixed until the whole process is completed.

I have listened with very great admiration and respect to the claim of our friend, Dr. McKellops, for the great superiority of platinum and gold foil. For years I made a great number of such fillings, in very many cases with such magnificent results as he has obtained, according to my inferior skill. But there is a point which he has not touched upon, and which, perhaps, has not occurred at the moment to so clever and distinguished an operator,—a point suggested, perhaps, in a letter which I chance to have in my pocket from the distinguished author, Mark Twain. He happens to be a personal friend. I may premise that while he is a man of great nerve, he has for some time been in such a state of health that a long-continued operation, accompanied with great nervous strain, would be objectionable. He says, "I have worn a sample in my head"—speaking of the porcelain enamel—"a month or two, put there by Dr. Thomas. For eight years I have worn cement and other kinds of mud in that old crater, and finally in London, last year, the dentist said the walls were so thin and frail he could not venture to put any pressure to speak of on the packing, and I must expect it to work out pretty soon, which it did, and even while it remained I was always uncomfortably conscious of its presence, and was usually fondling it with my tongue. It is all so different now. The plug fits like nature, and of course does not endanger the walls with pressure of any sort. I am not aware it is there, and that old snag is as serviceable a tooth as any one has."

SECTION III.—Continued.

A Résumé of the Important Changes that have Taken Place in Dentistry during the Last Thirty-five Years.

PAPER BY J. N. CROUSE, OF THE SECTION.

MY first recollection of dentistry is as yet vivid in my mind. A country dentist came to the house of my father, who was a farmer, to do the dentistry for the family, and my part in this was to be one of the patients. After being placed in the chair a discussion arose as to the best means of remedying the irregularity of my front teeth. It was decided to extract the two lateral incisors to correct the crowded condition, so the dentist removed the right one. At this juncture, instead of using the cuspidor, I jumped from the chair and ran away, not returning until I was sure the dentist had left the house. This insured me a sound thrashing from my father, but my other lateral incisor was saved.

The second incident which I think worthy of mentioning was, when a boy, of going to the office of a man who was a jeweler, a dentist, and a good sportsman, with a view of selling him a hunting dog. While there he asked me to witness the operation of filling a tooth. Having a variety of cylinders of the non-cohesive gold, he applied napkins and made a large gold filling, which I had the pleasure of examining when serving the same patient professionally twenty years after, and found it in first-class condition. I give this testimony of a man who forty years ago filled teeth successfully in a country town and repaired watches between times. Such cases as this could be easily duplicated in the experience of many other practitioners, and would show that teeth were successfully filled when the aids were scarce and very crude; but I desire more espe-

cially to bring up for discussion that old method of filling teeth with non-cohesive gold, a practice almost abandoned at present.

When I first commenced the study of dentistry there were four dental colleges, and few men considered it necessary to take a course, which was then two years of four months each, and five years' practice was equivalent to one course of four months.

At this period there were no means of keeping the cavities dry except by use of the napkin and bibulous paper, so that filling teeth with gold under water was not an uncommon practice. The first and most important change in operative dentistry grew out of the use of rubber-dam, which was introduced to the profession by Barnum, of New York, late in 1865 or early in 1866. This important invention was not patented; although an effort was made to secure a patent, it was unsuccessful, on what ground I have not taken the time to look up, but I believe that proper effort would have secured a patent and thus have given to the inventor a compensation which he deserved, as his invention has been probably the greatest and most beneficial gift that the dental profession has ever had.

Following close upon the use of rubber-dam came the more general use of cohesive gold, as the dam made absolute dryness possible, without which cohesive gold was comparatively useless.

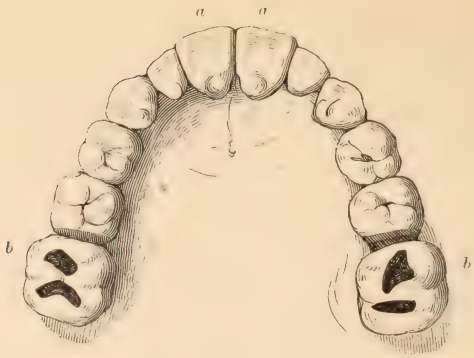
Then came, through the wisdom of Wm. H. Atkinson, of New York, the use of the hand mallet for condensing gold, and following this the various automatic and electric mallets. Dr. Atkinson also introduced heavy gold foil for filling teeth, which was adopted by the leading practitioners of the whole country. This was about the fall of 1868 or the spring of 1869, and its use marks a period in operative dentistry when the quality of gold fillings was of superior character to anything previously known. This gold ranged from 60 to 240, and the fact that gold as heavy as this could not be condensed with anything but a mallet caused important changes in plans of operating. First, it necessitated making every point of the cavity accessible to direct mallet pressure, and this necessitated the opening of the cavity to a much greater extent than before, and the practice of wedging the teeth apart became more general, all of which was wise procedure.

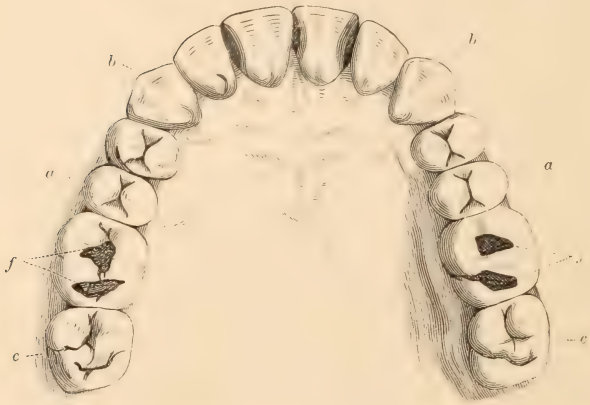
Close upon this came the invention of the dental engine. The first was brought into successful use by George F. Green, of

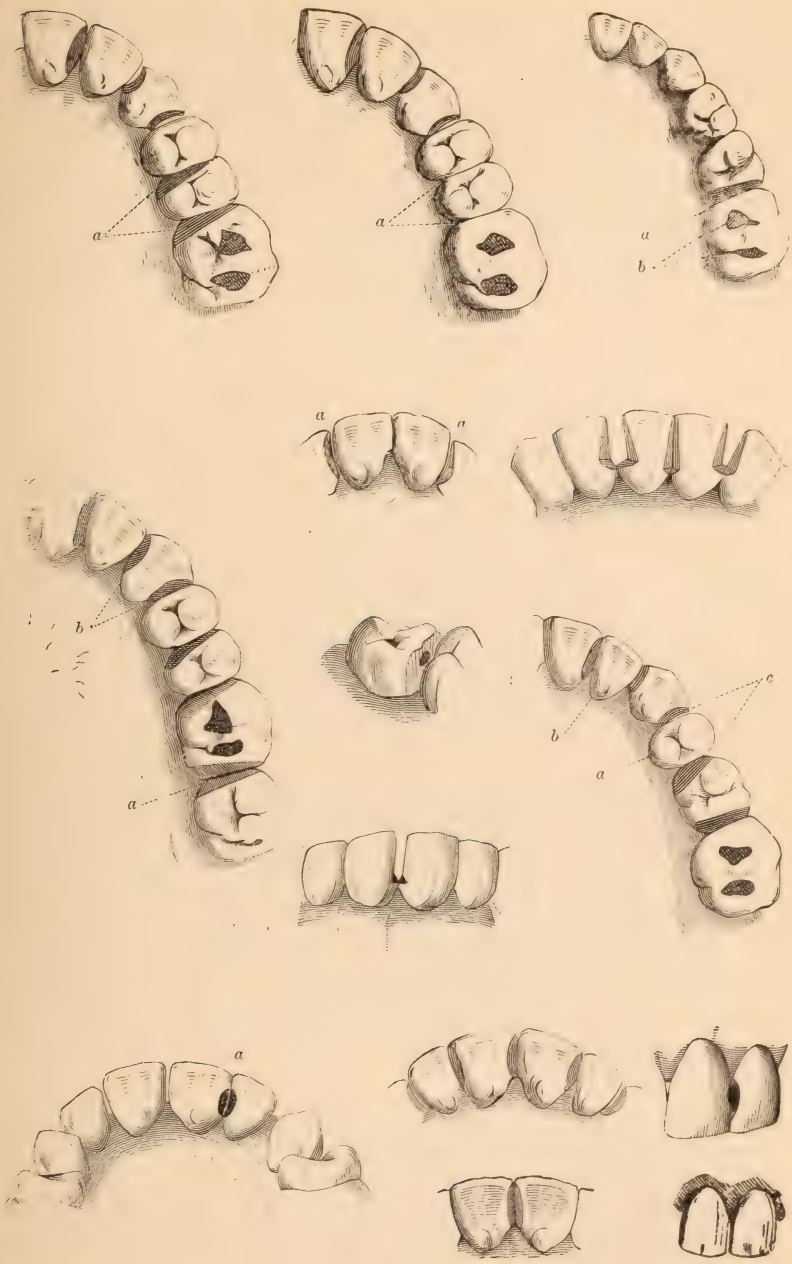
Kalamazoo, Mich., who was not a dentist, but an inventor. This engine was propelled by air drawn through two fly-wheels by an exhaust bellows worked by the foot of the operator, and was known as Green's pneumatic engine. It had the objection of being very noisy, but otherwise was a superior implement. This he disposed of and soon brought out another, which ran by electricity. I purchased one of the first of them, and have the parts here with me. They show the plan on which the engine was run, and also show the crudeness of the hand-pieces first used, which was characteristic of all of them, the bit or drill being forced into a socket by a pair of pliers. At the meeting of the American Dental Association in 1871 both Green's pneumatic and Morrison's treadle engines were first exhibited to the public. Soon after this cord, treadle, and electric engines of various forms came into use.

It is not necessary to go into much of a history of these different appliances, which have since been improved upon and brought to a high degree of perfection. With these superior instruments followed the abuse of their being too much used in practice; especially was this true in connection with the practice of cutting the teeth apart. With the use of corundum wheels and various cutting implements in the engine, the operation of making extreme separations in the approximal surfaces of the teeth was much facilitated. At the period in dentistry referred to it was a common practice to make wide separations between the teeth as a means of gaining access to the cavity, as well as with a view of preventing the recurrence of decay. In fact, before the engine came into use the chisel and file were much employed for this purpose.

This practice was further encouraged by a treatise published by Robert Arthur, styled "Treatment and Prevention of Decay of the Teeth." This book was written in an attractive manner, and was adopted by a great many practitioners; and while there are some operations therein described that can be used to advantage, the practice, generally speaking, proved to be detrimental, and increased the already too-prevalent practice of cutting teeth away for the prevention of decay. While it would not be wise to go into a review of this treatise by Arthur in this paper, I have had cuts made which illustrate the methods advocated. The practice of cutting away the approximo-lingual surfaces of the six anterior teeth, where caries occurs on the approximal surfaces soon after the teeth


a
a
b
b


b
b
a
a
f
c
e


a
a
a
b
a
a
b
a
b
c
a
a

have erupted, and thus removing the cavity, as illustrated in the cuts, I have found very beneficial. In the most extreme cases I do not call to mind one where decay recurred after this treatment; but the practice advocated for the molars and bicuspids, generally speaking, is faulty. At the same time I wish to condemn as unwise the practice of separating teeth generally in the human mouth, both as impairing their efficiency as masticators of food and also as being a method which causes destruction of the sockets of teeth when spaces are made which allow food to press between the teeth and impinge on the gum-tissue. I hardly think it worth while to go much into the details of the evils of this kind of practice, except with a view of emphasizing, which may as well be done here as anywhere, the importance of completely contouring the interproximal spaces of the bicuspids and molars as a means of increasing their usefulness in chewing, as well as to prevent the loss of the sockets through the injury to the peridental membranes, as above indicated. I feel justified in saying that I have had unusual opportunities for observing the effects of radical separating and the benefits accruing from restoring the teeth to their original contour, and no service that I have ever performed for patients was recompensed by such gratitude as the remedying of this evil. It made the patient comfortable and in some cases restored lost health that was apparently caused entirely by lack of means of masticating the food.

Next in importance in the history of dentistry was the discovery of the real cause of dental caries, for which we are indebted to Miller, of Germany, who was the first to give positive proof. This important discovery made it possible to practice dentistry with much more intelligence than when it was a matter of guess-work as to how caries was brought about, and therefore it is not surprising to find, in reviewing the various methods of practice up to that date, that many mistakes were made and theories and practices adopted which look unwise, if not foolish, in our present state of enlightenment.

However, a method of practice has been advocated to which we now call attention, and the adoption of which is unexplainable except on account of its extreme and radical errors. I allude now to what is known as "The New Departure" theory, and probably no one thing ever brought before the profession has been so harm-

ful as the practice of this theory. While it was launched twenty-odd years ago and has been kept before the profession more or less ever since, still it might be well to here give a little review of it. Part of this "New Departure" creed was promulgated by S. B. Palmer, of Syracuse (1874); J. Foster Flagg, of Philadelphia, and Henry S. Chase, of St. Louis (1876). Let me repeat here some of the propositions which constituted their theory. According to Palmer, electricity was an important element in the destruction of the tooth-substance when filled with metal; his idea being that there was chemical and galvanic action upon the teeth and metal used for their preservation. This electric theory in various forms was advocated by others before this, and Bridgeman wrote an attractive article on the electric theory in 1861. We think this, however, of all the theories ascribing to electricity the destruction of tooth-substance, that, if they do not stand absolutely disproven, their correctness has never been established, and this part of the "New Departure" belief is still surrounded by mystery.

The other and more prominent phase of the "New Departure" theory was that gold was incompatible with tooth-substance, and that it was too hard a material to pack against the walls of dentin or enamel. This was especially true of what they called frail or soft teeth,—that gold not being acted upon by acid where defects occur or where decay recurred, the tooth-substance was acted upon wholly, and so the destruction went on more rapidly than where a substance was used on which acid operated also; therefore the material that was affected by acid was better; that a leaky filling was better than one that did not leak, proof of which was offered by the assertion that a filling made with gutta-percha was the leakiest and yet the best filling. In short, the proposition was to abandon gold and substitute plastics as the main filling-materials.

When we take into account the fact that scientific investigation of the character of amalgams and plastics has proved that all these materials at the date alluded to were so defective as to be wholly unreliable for permanent fillings, the wonder is that so many sensible practitioners were misled by the theories promulgated, the carrying out of which worked the greatest amount of injury imaginable to operative dentistry. This is especially emphasized when we consider the more recent investigations of Dr. Black on the physical characteristics of tooth-substance, which disprove the only

element in the "New Departure" theory which had a semblance of truth. This is to the effect that the specific gravity and the qualities of teeth in their natural state are very uniform; that the tooth-substance is harder than the filling-materials used, including gold. Barring the recognized faults of form which give lodgment to food *débris*,—fissures, imperfect closure of the lines of junction of the enamel plates, etc.,—as the conditions favorable to the beginning of caries, the theory that some teeth are soft and some hard in their natural state, and that the former decay more rapidly on account of this difference, I think is proven to be incorrect. The cause of rapid decay and recurrence of decay is due to the peculiar characteristics of the secretions and the surrounding environments, requiring further investigation to prove what these different conditions are, and this is one of the mysteries yet unsolved. I refer to these investigations of Dr. Black's because, although they were made public four years ago, I believe they are as yet but imperfectly understood, but that when recognized they will cause a radical change in the methods of practice. I have made a condensed summary of his investigations and conclusions, which will appear in print next month, giving the substance of what he has written, which I hope will be read, so that his conclusions will be more fully understood. If his deductions are correct, and I believe they will be found to be so, methods of practice must be conducted accordingly.

The investigations by Drs. Black, Wedelstaedt, and others, pointing out the great imperfections in amalgams and the causes of these defects, led to experimentation which has shown us that it is possible to make amalgam so free from the defects which have characterized it in the past as to make it one of the most valuable filling-materials known. The furnishing of the improved alloy has not completed the reform, however. A better understanding of the physical characteristics of this material is much needed by almost all practitioners, in order that it shall be manipulated properly and the preparation of the cavity so made as to insure more perfect results. Although much has been said and written about how to prepare the cavity and how to manipulate amalgam, the course still pursued by the general practitioner is so lacking in the essential features as to make amalgam fillings very defective, even when the material itself is not at fault.

For the purpose of inciting discussion, so as to secure a better understanding of the proper methods of manipulating amalgam, I will venture to give a little in detail the essential points to be observed in its use. In doing so I will also discuss some of these physical characteristics alluded to, speaking first of the peculiarity of this material to shift under pressure. A stiff-working, quick-setting amalgam is found to be the most desirable; and where the cavity has not four walls a metal matrix should be used, which should be made secure in some way; tying or setting with cement are probably the most desirable methods. Careful investigation has proven that it is desirable to use much more force than is generally used in packing the amalgam, otherwise the mass will be porous and imperfect at various portions.

The action of amalgam denominated by Black as "flow" is another of the characteristics which should be kept well in mind in its use. This peculiarity accounts for what was originally thought to be spheroiding. In short, it is this: that pressure upon the mass causes it to change its shape, so that the bulging seen where it has been in use in the mouth is due to this "flow," and the cavity should therefore be prepared with a knowledge of this characteristic. Briefly, the cavity should have no sloping edges; the walls should be perpendicular, and the base for the filling to rest upon flat or square. Time will not allow further elaboration, but I hope sufficient has been said to call out thought and discussion on this subject.

The cements in use are still very imperfect, and the improvements in them thus far have not been so marked, but, as we have papers to be read on this subject, I will leave them to discuss our needs in this direction.

To summarize, what have past results and experiences proved?

First, that the practice of filling with non-cohesive gold in the form of cylinders is too valuable to be abandoned; that non-cohesive gold in the form of cylinders can be used to great advantage alone or in connection with cohesive gold by using the cylinders at the cervical margins of large approximal cavities and finishing and contouring with cohesive gold, thus saving time and making the operation safer at the most dangerous point.

Second, that heavy gold, say No. 10 or 20, can be packed into the cavity more uniformly and with less pressure than lighter gold,

which is matted into cylinders and blocks, for the reason that the gold is kept more even, and is thus more easily condensed. To make these operations perfect, the importance of securing plenty of space need not be urged, as this will be admitted.

Third, that where the ravages of decay are the most active, or perhaps we had better say where the walls are very frail, gold is far the most suitable material with which to bring about the desired results.

Fourth, that in very young patients gold is not so desirable for large operations; not because of the teeth being too soft, but because the peridental membrane is more likely to be disturbed and injured at so young an age by the malleting. The same is true of patients where the teeth have a tendency to loosen from loss of alveolar processes, or what is familiarly known as pyorrhea, a disease not as yet well understood. In such teeth the injury to the peridental membrane by malleting makes gold less desirable than a material that can be inserted with less force.

Fifth, that it is wise practice to protect the danger points by extension of the cavity where decay is likely to recur beyond the filling. In this, however, as in most of the practice of dentistry, good judgment is prerequisite.

Sixth, that where the occluding surface is impaired by open spaces, either from teeth having been formerly cut away or from decay, or from whatever cause, they should be overcome by contouring and the patient be given every chance for mastication.

Seventh, that the great field yet unsolved is to ascertain the cause of dental caries. To know how decay takes place and why it takes place in one mouth and not in another, or in the same mouth at one period of life or under certain physical conditions and not in another, is the problem of the day. Every practitioner must have seen in an examination, say of a little child whose deciduous teeth are fully erupted, that in one or several cases extensive caries is in progress, and then in examination of another we see the surrounding tissues in a perfectly healthy condition and no caries. This illustration would also hold true with adults. What conditions are present to make these differences? Who will solve the problem?

DISCUSSION.

Dr. S. B. Palmer: I was not present to hear the whole of this paper read by Dr. Crouse, but I understand that it touches on the causes of dental caries. I have been represented as having a theory opposed to the investigations of Dr. Black, Dr. Miller, Dr. Williams, and others, and I wish to correct that impression, so far as it relates to any antagonism to the points claimed by the gentlemen in regard to the etiology of dental caries. I hold that there are two causes,—one external, or from the environment, as maintained by the gentlemen mentioned, produced by micro-organisms, which generate lactic acid and so forth. You all understand that, and in it we agree.

But I have further maintained that the pulp has to do with bringing about certain results in connection with the use of gold for filling teeth which are not yet developed. Mark the distinction. I wish to say that teeth in a normal condition, or even of a lower grade than that to some extent, may be, and are, preserved with gold. But there are conditions in which when a conductive filling is introduced into the dentin, the thermal changes upon contact with the gold being abnormal, nature does not deposit against the metal, and the dentin remains the same after the introduction of that filling as it was before it was introduced. It is not calcified, and the vitality of the tissue in contact with the filling is destroyed. Remember, I have nothing against gold, except that it is a good conductor.

Whether this condition which I have referred to produces any ill effect or not depends on how this eschar or non-conducting medium is related to the two organs. In a normal tooth this eschar has no effect; that is to say, it is a non-conductor, and the dentin is a non-conductor, and everything works harmoniously. In the other case, where the dentin is highly organized and there is inflammation, then the tissue becomes devitalized and decomposed on account of the thermal changes. I will omit scientific details, and try to put it in a way that you will understand. The heat of the food taken into the mouth as we take it is abnormal, but it does no harm to the tooth unless the filling is an electrode which enters sensitive dentin. If the dentin is sensitive there will be no more deposits there, and the tooth will remain as it was when filled, and in a few years we see just the condition which we see when teeth

are filled for children from eight to twelve years old. In approximal cavities the decay begins around the filling, which it would not do with gutta-percha. I state this very briefly to illustrate the difference between the influence of gold or any metal conductor and cement or gutta-percha in a tooth that is not yet developed. The latter, being a non-conductive material, would allow nature to go on as though the tooth had not decayed. In a few years, it may be five or six, that tooth would be suitable to be filled with gold.

The difference would be that in the one case you would preserve the tooth and have it in a healthy condition, and in the other you would have to repeat the filling once or twice, and the pulp might become exposed.

Dr. Black: I had gone out from the room for a few minutes, not thinking this discussion would come on this morning, and did not hear the paper read, but I have looked the paper over and am sorry that I have missed any of the discussion.

It is very interesting to us to run back over the history of the development of thought upon any of these subjects, and particularly in relation to operative dentistry, or to filling teeth; for we set more store perhaps by conservative dentistry than anything else. In this filling teeth holds the principal place, and the development of ideas along the line of the study of dental caries and those operations undertaken for the arrest or limitation of the injury produced by caries will ever be the most interesting to us. Dr. Crouse has reviewed in a brief way some of the history developed during his practice and personal observation, and has noted the changes that have ocurred in our notions, in our knowledge, and in our study of filling-materials as well. Many of us older men can remember the reign of non-cohesive gold. We were trained in the first instance in the use of non-cohesive gold, making all of our fillings of that material, which, as you know, requires four good walls in order that it may be successful. When I speak of non-cohesive gold I mean just what I say,—gold that will not cohere. Lately a notion has been entertained that we may use a semi-non-cohesive gold. Do not do it. Either use non-cohesive gold or else cohesive gold.

We have run through the gamut of non-cohesive gold, used in cylinders, about the only way to properly use it, and cohesive gold, then the heavy gold following immediately or almost immediately, and back again to the lower numbers for a large part of our work.

When I say low numbers I mean comparatively low numbers. We speak of 10, 20, and so forth as heavy gold nowadays, when we formerly used 60, 120, and even 240 as heavy gold.

In the history of all these processes the crystalloid golds and the various forms of precipitated gold have also come up. I believe Dr. Crouse did not mention them. They have been experimented with largely, but have never gained a lasting foothold. Most of us have laid them aside. A few still use them and others see much that is beautiful in these crystal forms,—so much that is easier. This gold is so plastic, it works so beautifully, that I do not wonder that there is still a disposition on the part of many to experiment with it. Yet there are conditions which can be demonstrated that will forever prevent this beautiful working gold from becoming the gold for our general use. Its form is such as to invite deterioration of the welding property. This welding property of gold, as some of you know, has been something of a hobby of mine, something of a study. It has developed during Dr. Crouse's personal observations along the line of dentistry, but it was very early in his career.

Now, these matters along this line of history should be very carefully studied by every student. I am sorry to find that in most of our books the welding property of gold is only alluded to in a paragraph. The history of these observations upon the welding property of gold should be given to every student in our schools from its beginning up, in order that they may gain a clear conception of it. The chemical experiments should be made. There are very few in our profession to-day who know anything about this history. The questions have been settled practically, and the discussion is so long past that the younger men coming into the profession do not obtain a clear understanding of the welding properties of gold.

Then the history of our notions of caries, as the subject has been studied and exemplified and experimented with, and demonstrations have been made through the years over which Dr. Crouse has passed in his review,—the history of these changes in thought is not being practically taught to our pupils. It may be obtained by taking the old books and running through them up to the present date. We need a good deal more study of the old books, for our notions have been changing rapidly of late, and we should connect the new with the old to see what of the old is still held and what

has fallen out, or what may be considered waste products of thought. We are losing our footing, and not understanding that much which the world considers dead to-day is as good as ever. It is only explained and made more perfect by the later studies. All of these things should be carefully gone over and connected, bringing together the concensus of thought as it is developed and expanded from year to year.

Dr. Crawford: I feel as though it is something of a presumption on my part to make any remarks upon such a paper as has been read in the Section over which I have the honor to preside; but there is so much of interest in Dr. Crouse's *résumé* of subjects which have been considered by our profession in the last thirty-five years that some matters of importance are suggested to me, to which I beg pardon for calling attention.

It would be well for us all to study very much more of the history of dental surgery than we do. It would be very interesting to ascertain when the first operation in dental surgery was performed, from the standpoint of civilization. But in the investigation of the subject we would do well to appreciate the fact that some of the minor principles of dental surgery have been known for a long time, and the accurate ascertaining of what has been done, not only by the human family, but in the intuitive surgery of the lower animals, is as much entitled to the appellation of being called surgery as a major operation performed now under the most thoroughly aseptic conditions. And I say we as a profession, because we have disregarded this history, have lost very much that is highly instructive and suggestive.

For instance, it is suggested that the study of the history of our profession should be confined to the last year's course in college. Yet the same institutions require that a man should be somewhat familiar with the history of the country in which he lives before entering a dental college. My own pronouncement upon that proposition would be that he should take on an early course of general reading, covering the entire field and the great domain known as dental surgery, and that that character of reading should be along in the first days of his study, in order to give him an adequate conception of the wonderful field that lies before him. Through the reading of such papers as this the fact will be developed that we have been forgetting while we have been learning.

I will only address myself to the last proposition stated in the paper for what it is worth, and I want to indorse the philosophic declaration that notwithstanding all the investigations upon the subject of the etiology of dental caries, it has not been absolutely and definitely settled. There are yet etiological factors in the production of the thing we call dental caries which show, with due regard to the opinion of some gentlemen abroad, that the disease under consideration is not a definite disease, but that it is simply a local manifestation. I believe that it has some of the elements of infection and contagion in it. I am glad that the gentleman who is to give us a succeeding paper will consider to some extent the great law of immunity. If we as a profession could give it the highest philosophic point of view, and look at the great law of immunity as we look at the great law of infection and contagion, that is the channel through which the future dentist is to work, and absolutely settle, if possible, the etiological signification of dental caries, and then, through the great medium of the therapeutics of the world, from the standpoint of the great doctrine of immunity, we may hope not only to render the human organism immune from the virulence of smallpox and diphtheritic poison, but we will also accomplish the fact of rendering immune the tissues upon which we, as dental surgeons, are called to operate. That is the future problem, that is the future work of the dental profession. I believe it can be accomplished, because within the last thirty years of my life I have been observing conditions of partial immunity, conditions in which tissues which have been more susceptible and liable to disease will pass on to a period of immunity. If partial immunity can be accomplished, perpetual and complete immunity ought to be accomplished. I see no reason why this law that covers the etiology and origin of dental caries should not become subject to the same law that presides over the fact of rendering the civilized world immune from smallpox.

I know, Mr. President, that I am enthusiastic on this subject, and the man who would not become enthusiastic over what he has heard at this meeting I do not think will become enthusiastic at all. I hope this enthusiasm of mine will at least provoke some young mind to develop into the world such truths and thoughts as will unravel the difficult problem referred to in the last portion of the paper, and settle the definite causes of dental caries.

Dr. McKellops: I do not exactly like what my friend, Dr. Black, said in relation to gold. We know that all gold foil that we use in the profession is supposed to be pure gold, and all pure gold, no matter in what form it comes, so long as it is beaten into foil, will be cohesive. You cannot help it. It is there, and that is what you will find when you are using pure gold in filling teeth. There is no way to get around it. The gold is cohesive. When you use it it is soft and perfect, and there is no difficulty in manipulating it if you take proper care to do it and your cavity is dry. Your work is accomplished right there and then.

Now, I say to gentlemen here that in filling with amalgam, if they will take the precaution to clear their cavities nicely and take oxyphosphate and make a foundation, the tooth will last. And let me tell you that if that foundation is properly prepared the oxyphosphate will keep that tooth for years and years, and you will find no decay under it.

Now, I ask the profession this one question, I make this one request as we are going home, that you will investigate this thing, that you try this oxyphosphate to line your teeth with. Try to protect children's teeth until they get to be old enough to stand the putting in of gold fillings. There is nothing that a man cannot accomplish if he will. Take an old person, and you can save the front teeth, keeping them there instead of putting on crowns and everything else. You can fill up those teeth and keep them there year after year without the slightest particle of decay appearing after the oxyphosphate is properly put in. I defy any man to produce a case where decay takes place if proper care is taken in putting it in. I have been operating pretty nearly sixty years now, and I have never yet used an amalgam filling, nor seen the necessity for it; but I do see the necessity of what I have suggested, and when you have a material that will protect you in all your operations you ought to take advantage of it. Care wants to be taken with it. When you take this material and put it in, and see how beautifully you can keep those teeth year after year, any one ought to be willing to use the oxyphosphate. Suppose it wears out a little. When they come back you can fix it up. Take it out and you do not see a particle of decay under it. I ask the profession to try this, and to see what advantage they will gain for themselves and their patients.

Dr. Noble: Just one word on the subject of filing teeth, which was alluded to. I have a little experience in that direction that perhaps it will be well to give.

When I was a student in my brother's office, a young man who was a friend of mine came in and wanted me to fill a left superior lateral incisor which was a little decayed. I saw that it was quite small, and cut from the lingual surface so as to try to get at it instead of wedging it as I should have done. After a while I found that it was very shallow, and I thought, "Why can I not cut it a little more and polish it all off?" I did so, and the young man went home and told his father what I had done. His father came down very much enraged, said I had ruined his son's tooth, and wanted to hold my brother responsible because it was done in his office and I was his student. Well, that tooth was viewed by Dr. Edward Maynard and my brother. They said I had done wrong, that it was not exactly the thing to do, but that now there was nothing to be done. I had cut it away, put in a piece of tape with pumice stone, and polished it away.

That man has continued my friend ever since, and that was done in 1854. I saw that tooth only a week ago, and it is perfect to-day. There is no decay in that left superior lateral incisor, while some of the others that I filled at that time have been refilled and are badly broken down, and I wish I had done a little more of that on one or two of the central incisors. I do not mean to indorse the idea that we should all go in and cut off surfaces. I believe fully in the contouring of all teeth back of the central incisors, or including the central incisors, if it is done with care and judgment. There may be a time when a little superficial decay would be much better cut from the lingual surface of the upper incisors than to take our engines and burs and dig a big hole in the tooth.

Dr. Barrett: It is said that God cares for the lame and the lazy, and the devil cares for his own. I do not know how that may be, but the most of us, when we get old and lazy, resort to plastics a little more often than we did in our enthusiastic youth. Dr. McKellops never gets either old or lazy, and hence he is immune to all of the weaknesses to which the rest of us are subject.

Now, I do not desire to plead for the amalgams nor for the cements. I know that in my younger days, when I felt stronger and had more enthusiasm than I have now, nothing short of gold

would content me. But I am getting so that the shortest thing that will content my patient and answer my own scruples of conscience serves for me. And yet I am far from being satisfied with some of the results which I reach, either with gold, amalgam, or cement. I am thoroughly convinced that some of the cements, some of the oxyphosphates, etc., will preserve teeth better than anything else, so long as they retain their integrity. And when we can find a cement of that character which shall be indestructible, we shall have reached the millennium and there will be no need for further prayer. At present we are petitioning for something of that kind, and our supplications are frequent and fervent, provided we are honest with ourselves. What may be the mysterious nature of amalgam that causes it to undergo all the changes that it does, is more than I can comprehend. Dr. Black has solved some problems. I have gone over his work as carefully as was within my power under the circumstances, and while I can indorse the greater portion, there are some conclusions in which I cannot agree. I certainly cannot concur with Dr. Palmer in his estimate of the dissolution of tooth-substance through electrolysis, which is substantially his theory. I do not think that any currents that may be generated in the mouth are sufficiently lasting to produce these effects. And yet caries goes on in the mouth, around the work of the worst of us, and, so far as my observation goes, around that of about the best under certain circumstances. I think amalgam undergoes certain changes. I believe that the flow of amalgam accounts for a great many of them, but after all, gentlemen, when we come down to the basis and bottom structure of the whole thing, if we belong neither in the category of the lame nor the lazy, and have sufficient ability, gold is the only thing which really satisfies the inmost longings of the honest dental heart. That is about my idea of it. But it is limited in its application. There are instances in which my own skill is not sufficient to produce the results which my heart desires, and I suspect it may be the case with others beside myself. In that case we must apply to —what? To the very next best thing, and the older I get, the more my experience accumulates,—and it is beginning to pile mountain high even now, poor as it may be,—the more I rely upon some of the plastics, like the oxyphosphates. I renew them again and again if necessary, and if they are repaired within a reasonable

length of time, there is little loss of tooth-substance. There is no necessity for approaching the dental structures at the confines of the cavity. I simply round the filling out again and restore its contour. Hence, as I get more lame and more lazy I rely more and more upon this, and I declare to you, gentlemen, it satisfies my conscience, which is rather a tender one, by the way. It answers my professional moral sense, and I believe I can render my patients, under certain definite circumstances, better satisfaction with oxyphosphate than I ever could with gold.

Dr. Crouse: I had two or three objects in view in writing this paper. The first proposition that I wished to have emphasized is in regard to cylinder filling. I do not agree with Dr. Black that we must necessarily have four walls in order to fill a tooth with cylinders, for I have seen some excellent fillings made with non-cohesive gold in cylinder form that have lasted many years. I wanted to emphasize that practice, because it is almost lost. I should not like to practice dentistry if I had to give it up. I take care of the cervical margins of very large cavities with large cylinders of non-cohesive gold, and often drive cohesive gold (No. 10 or 20) strips into that and contour my tooth, thus saving much time and, as I think, making a more accurate operation than the same kind of fillings will average with cohesive gold.

Dr. Black: Evidently Dr. Crouse has misunderstood me, and probably others have. There is no disagreement between myself and Dr. Crouse about the use of cylinders of non-cohesive gold on cervical margins. What I said about requiring four walls for the use of non-cohesive gold refers to the use of non-cohesive gold alone, using no cohesive gold whatever. I most certainly advocate, as Dr. Crouse does, the use of non-cohesive gold in the form of cylinders upon cervical walls, and that by it we save time and make better operations.

I would like to say, if the President will allow me, that I have now had five full years of experience with amalgams strong enough not to flow, and that neither shrink nor expand. I have made fillings with these under conditions such that I could observe them, and have observed them within a very short time, and among those fillings there is not a single discoloration of a margin so far as I have been able to observe, and I have observed a good many of them. They are being watched, and it is now my

opinion that fillings made properly of amalgam, properly constituted and properly annealed, will give this result. The future will tell.

Dr. Crouse: I forgot the most important thing which I wished to bring out and have discussed, and that was the method of removing superficial decay from the six anterior teeth, where you see there is going to be an immense amount of decay in the mouth. Take the cases where you operated in that way many years ago. I recall a patient coming to me some twenty-eight years ago, and who has been coming ever since, where I filled one side, which was decayed no more than the other. One I have had to refill two or three times during that period, and the other has never required it, having never decayed any further. To repeat, I do not call to mind in the most extreme cases where I made that kind of an operation, between the laterals and centrals, that decay has recurred between those teeth.

SECTION III.—Continued.

Cements.

PAPER BY E. K. WEDELSTAEDT, OF THE SECTION.

MR. PRESIDENT and Gentlemen: Dr. Ames, of Chicago, has a paper on cement, and, as we have done a trifling amount of work together along this line, I have left the scientific side to be taken care of by him. It is not necessary for two of us to cover the same field. The substance of my paper, therefore, will be simply to call your attention to a few things that I feel are not generally known.

Dr. Black informs me that cements have been in use by the members of the dental profession for the past thirty years. Investigations into the physical properties of filling-materials have been going on for about this same length of time. It therefore seems strange to me that it fell to my lot to discover that the majority of cements in use could very readily be penetrated by moisture. Among the thirty-odd cements which were tested I found only one that the moisture would not penetrate from circumference to center. The attention of some of the manufacturers was called to this state of affairs, and I believe just one at once improved his product and sent me a cement that moisture could not penetrate. For thirty years we have been using cements that the moisture could readily penetrate. It can well be asked, "Why agitate this matter now? Has harm been done through their use, or not?" Personally I feel much harm has and does result from using any filling-material that the moisture can penetrate.

I will be frank and state my position in coming before you with a short paper on this subject. I wish the assistance of every man

who has the welfare and the progress of the dental profession at heart. It is very true one man can do much, but the combined efforts of many can do a great deal more. If each man will, the next time he has occasion to use any cement, mix a trifle more than he wishes to use, and then place this residue in a bottle of ink for a given number of hours, say twenty-four or forty-eight, he can readily ascertain after removing the mass from the ink and breaking the filling the extent of the penetration of moisture. If there is not any penetration, that cement, in that particular at least, is a good one to stick to. If the ink has penetrated that cement from circumference to center, he can be very certain that the saliva will penetrate it; and when the saliva can penetrate, the micro-organisms can penetrate also.

The question for you to decide is this, Do you wish to continue to use cements of this kind?

Here are some sample fillings of a certain cement, and I think on breaking the mass you can clearly see the anilin in the center of it. The tubes in which these fillings were made are somewhat over thirty-five millimeters in length. It is a very difficult matter to make anything like perfect fillings in them. Thirty drops of fluid are dropped on the slab, and about half a teaspoonful of powder is placed beside it. The quickest way for anybody to ascertain how difficult it is to mix so large a mass of cement is to try it. After the cement had been mixed it was removed from the slab and transferred to the palm of my hand, where it was rolled. (Each mass of cement mixed received the same amount of rolling.) The mass as it leaves my hands is between one hundred and two hundred millimeters in length by from three to six millimeters in diameter. It is then handed to the assistant, who cuts it into short pieces and places piece after piece in the tube as required. About eight or ten pieces are necessary to make one of the large fillings. The packing of the cement is accomplished only after considerable difficulty, and the filling that is finally made is, as a rule, very unsatisfactory. After the cement has been packed into the tube it is let alone until it has fully set. On several occasions on attempting to remove the fillings from the tube, fractures or partial fractures have taken place. These can be seen on some of these fillings.

I desire to say that these are not the only experiments that have been made with this cement; many others were made to ascertain

all I could about it before these large fillings were made. The results of all the experiments were most unsatisfactory. The small fillings that were made and tested gave me the same results as did the large ones. The tubes in which these fillings were made have alboline applied prior to having the cement fillings made in them. After the fillings have been removed from the tubes they are not washed in ether or alcohol to remove any traces of the alboline. I call attention to this for the reason that in my published accounts of former experiments made with cements the fillings were always washed in ether and alcohol before they were placed in the bath. Accidentally I dropped one of these sample fillings into the anilin solution without washing it, and I was very greatly surprised later on when I removed it to find that it did not make any difference in preventing moisture from penetrating. I at once made another series of fillings. On removing each filling from the tube it was dropped into a bottle containing sandarac varnish. It was left there a few moments, and then removed and placed in this bottle of water, in which some pieces of red anilin had been previously dissolved. Still I was not satisfied.

Another series of fillings was made, and after they were removed from the tubes they were rolled in some melted paraffin and then placed in this bottle. These fillings were made on the 12th of July, and they have been in these bottles since that time. I do not know what their condition is. I leave this for you to ascertain. I have, however, my own opinion in regard to their condition. I will hand these bottles to Dr. Johnson, who will open the discussion of this paper, and let him make the first examination. All these sample cement fillings have been made from the same package of cement. The strength of the anilin in these three bottles is the same. This was obtained in this way: A few grains of anilin were placed in one of these bottles when it was empty. This was dissolved in a little alcohol and water, and then the bottle filled with water drawn from the hydrant. This was then well shaken and divided into thirds, as you see it here before you. I ask that you make a careful examination of these fillings, and if you are dissatisfied with the results I have obtained you can very easily make similar experiments. You can thus verify the results to which your attention has been called. The experiments are so simple that anybody who has an interest in this matter can very readily make them for himself.

These fillings are seven millimeters in diameter by twenty-five millimeters in length, and the results of my experiments show that it takes somewhat less than seventy-two hours for the anilin to be found in the center of this large mass. It would therefore be a much shorter period of time for the moisture to penetrate smaller bodies of this particular cement. Some very large fillings of similar oxyphosphates show complete penetration by the moisture within twenty-four hours.

The penetrability of moisture into our cements is but one of three evils that we are compelled to deal with at the present time in regard to cements. The other two are contraction and expansion of the mass after it has been mixed. I was somewhat surprised to find some of my experimental fillings would expand two millimeters beyond the cavity in which they were made. I have been equally surprised to find shrinkage in some cement fillings when made in cavities in green teeth and tested in moisture. The anilin has run completely around the filling, leaving the axial wall of the cavity as well marked as though no cement filling had been placed in that cavity.

I do not think we as a class, knowing these to be facts, desire to use filling-materials of this kind.

The woeful lack of knowledge in regard to this subject is most apparent, if one is to judge from the statements of others. For example, Dr. First says, "I varnish all my cement fillings, and therefore I am not afraid that moisture will ever penetrate them." Dr. Second says, "I cover all my cement fillings with hot paraffin, therefore the moisture cannot penetrate." Both these good men seem to overlook one point, and that is that the varnish and paraffin simply protect the filling for a short time; and if it is one of the expanders, a crack is made which allows the saliva to creep in at once. Dr. Third can do the following with one of our well-known cements which is a bad leaker: He can mix it by one method of manipulation so that it will be moisture-proof, and by another so that the moisture will penetrate it. He can take that which was mixed to be moisture-proof, and by using certain principles of instrumentation can pack it into a cavity so that the moisture will penetrate it. He can also take that mix that was not moisture-proof, and by using different principles of instrumentation can pack it so that the moisture will not penetrate it. These allegations are

theories without any foundation. A cement that leaks, leaks; one that contracts, contracts, and one that expands, expands. Instrumentation and manipulation have more or less to do with the two last, but when it comes to the penetration of moisture I desire to say this: I have tried over one hundred different methods of manipulating cements, and a leaker would always leak. Every known principle of instrumentation that has been brought to my notice has been tried in packing these leaking cements, but still the moisture would penetrate as readily as before. That different methods of manipulation and different principles of instrumentation *do* influence the strength of the cement seems unnecessary for me to say, but they have no effect whatever on the ingress of moisture. On the contrary, a cement that does not leak, does not leak. It does not make any difference how thin it is mixed, so that it can be handled; and it does not make any difference if it is mixed to the consistence of putty, the moisture never creeps in. And, again, for years I have used X's cement. It is not moisture-proof, but it is a most excellent cement, just the same; and I like to work it. But it is not to be relied on, so something else must be tried. I have in the office some of Y's cement. I do not like it, but it is moisture-proof. I obtain a moisture-proof filling by mixing the powder from X's with the fluid from Y's, and in this way better results are obtained than if either the X or Y cement had been used by itself. For this reason the X cement is perhaps the best we have, so far as this relates to standing much wear and tear. The Y cement is not so good. Uniting these two seemed to produce the best results that I have so far been able to obtain. This is something new, and it is of importance to us at present, especially as this matter is so far from being settled.

There seem to be erroneous ideas prevalent in regard to the oxychlorids. It has been stated to me that the moisture would not penetrate the oxychlorids the same as it would the oxyphosphates. This is a mistake. Moisture does penetrate one the same as the other. I do not think it is possible to find an oxyphosphate that will take the place of an oxychlorid; in fact, I do not believe there will ever be an oxyphosphate made that will equal Justi's Acme. When this is properly mixed and packed into a cavity and there left for three or four days, I am perfectly frank when I say that I much prefer to cut dentin at any time than this hard, granite-like

substance. (I desire to beg pardon of the gentlemen of this society, for I agreed not to use the names of any cements.) So that there may not be a misunderstanding, I desire to say right now that my experience with this hard, dense, and strong oxychlorid has been most unsatisfactory when it has been used as a temporary filling. But for use as an intermediate layer or as a foundation in pulpless teeth only, I have never found its equal in any cement. Moisture does not penetrate this oxychlorid, but it has penetrated the other oxychlorids as readily as it has the oxyphosphates. Oxychlorids are of particular use to us in all pulpless teeth, and I think they are far better to use than oxyphosphates. They have been long neglected, and I think good use of them can be made by the members of the dental profession.

For somewhat over twelve months I have been studying cement experimental fillings microscopically. (It might be well if others would also do a little work along this line.) These examinations have revealed many things about cements. I have been very greatly surprised to find bits of wood, hair, cotton, broom straws, and much dirt in the center of many of the cement experimental fillings. Certainly, there is some carelessness shown by some of the manufacturers' employes. These things should not be found in our cements.

For the past week or two I have been studying terra-cotta, bricks, stone, etc., and making a comparison with my cement fillings. I find terra-cotta and the rest correspond very closely to the cement fillings, so far as this relates to the air-bubbles I find in the different things examined. I do not know where these air-bubbles come from, nor can I account for them. They are not so prevalent in the oxychlorids as in the oxyphosphates. This can perhaps be readily explained, as the liquid of the oxychlorids is like so much water, and it readily absorbs the powder with which it is mixed. A more perfect union is thus obtained. With the oxyphosphates we have a heavy syrup-like fluid, which is not so readily mixed with the powder. I do not know that these air-bubbles do any harm, but I felt it was well to call your attention to the fact of their existence.

It is necessary to call your attention also to one very important fact about cement fillings, oxychlorids as well as oxyphosphates, and that is the effect that age has on them. From one mass of mixed cement let us make six experimental fillings in the cavity block.

The fillings will be cylinders two and a half by three and a half millimeters. Each filling will be made of three pieces of cement, and each piece of cement will receive three blows from the automatic mallet. The packing instrument will be a smooth-faced bayonet plugger that is three millimeters in diameter. These fillings will be placed in three boxes. The first and last made filling will be placed in one box, the second and fifth in another box, and the third and fourth in another box. The boxes will be numbered one, two, and three. At the end of twenty-four hours the two fillings in box No. 1 will be tested. A filling will be placed in the dynamometer and the pressure turned on. As a rule when eighty pounds is reached the filling goes to pieces. The second filling is then placed in the dynamometer. When seventy-five, eighty-five, or ninety pounds is reached the second filling will go to pieces. At the end of forty-eight hours the fillings in box No. 2 are tested, and it may surprise you a trifle, but it is not an uncommon thing to have these small cylinders carry two hundred pounds before going to pieces. When seventy-two hours have passed the fillings in box No. 3 are tested, and it would not surprise me in the least to have them carry three hundred and fifty or four hundred pounds before they would crush. In reality, I have one cement in my office at the present time from which fillings were made by this method that carried but thirty or thirty-five pounds of stress when they were tested at the end of twenty-four hours, whose mates, fillings made from the same mass and mix and at the same time, all made as nearly alike as possible, carried upward of four hundred pounds of stress before they crushed when tested at the end of ninety-six hours. Now, I do not know whether this is of that importance and value to you that it is to me, but I no longer place metal fillings on freshly made cement. If there is going to be contraction or if there is going to be expansion of the cement placed in any cavity, I wish it to take place before the metal filling is made.

In conversation with my friend, Dr. Lehnen (the well-known chemist), he informed me that the trouble we had with cements was largely due to our not knowing how to mix them properly. He alleges that there is a certain point that makes a homogeneous mass, and the moment we pass this point we weaken our cement. If the cement is insufficiently mixed it is also weakened. I at once took cement, spatula, and slab to Dr. Lehnen, and asked for a practi-

cal demonstration of what constituted a homogeneous mass. He gave it me. I returned to my office and at once made some experiments with the cements I was then using, and, to my utter dismay, I desire to say that the difference in the penetrability of moisture could be detected without any trouble. Can I hear some one ask, "How was this possible?" I will cheerfully explain it. Dr. Lehnen's homogeneous mass was somewhat different from that which I thought constituted it. I at once mixed from the same package a mass of cement on the slab. "That is a homogeneous mass, according to Dr. Lehnen," I said. A piece about seven millimeters in diameter was laid to one side and a dent made in its center. More powder was then added to the mix, and the spatula well used on it. A ball about the same size as the first was taken from this mix and two dents placed in it. More powder was then mixed with the mass and the third ball made. These were left to harden for about fifteen minutes on the slab. All were then placed in the same anilin solution and left there for twenty-four hours. At the end of this time they were removed, washed, dried, and examined; and, gentlemen, I very much regret to say it, but the one called a homogeneous mass showed the least penetrability. The one with two dents showed much more penetration than the one with one dent. The one with three dents was penetrated to its center, while the one with the one dent showed that it had been penetrated only to about one-quarter way to its center. I should like to show you what Dr. Lehnen showed me as a homogeneous mass, but I do not know how I can do it.

It is said there are eighty thousand dentists in this world. If each used but one ounce of cement a year it would amount to about five thousand pounds. I think forty-five hundred pounds of this would, on account of what I have mentioned, be unfit to place in the cavities of the human teeth. The sooner that we are rid of cements that contract, that expand, and those which moisture can readily penetrate the better it will be for us, our patients, and the manufacturers. I believe the last will be the first to improve their wares after they find we will not buy nor use cements of this kind. Just so long, however, as we continue to buy them, just so long will they be manufactured. As soon as we create a demand for a better article we shall have it. It was a very short time after I created a demand for a better cement that I received it. It lies in your power

to create this demand. I have called your attention to the necessity for it, and I feel there is little call to do more, for I feel certain with this knowledge before you sufficient interest will be aroused to have at least individual, if not concerted, action.

I desire to acknowledge my indebtedness to Drs. G. V. Black, C. N. Johnson, and W. V-B. Ames for many valuable suggestions that have been made to me in regard to this work. Dr. Ames and Mr. John F. Hammond have furnished me with many samples of cement. The former, in particular, has at all times not alone been anxious, but most willing, to assist me in every way possible in this investigation. Without Dr. Ames's assistance it would, beyond a question, have been many years before as much knowledge would have been gained in regard to this subject. He has been an indefatigable worker, and has given me much assistance.

I trust, gentlemen, that at the next meeting of this society much more will be known about cements. I desire to thank you for your attention, and hope that great and lasting good may be the outcome of your labors.

DISCUSSION.

Dr. C. N. Johnson: In opening this discussion I shall confine myself to unsealing these bottles which I have here on the table, explaining what they contain, and giving the results.

As Dr. Wedelstaedt has said, these bottles are filled with precisely the same kind of cement, and on the same day. The specimens in the bottle that I am to open now were deposited without being placed in varnish or paraffin. I break one of them and I find, even without the use of the magnifying glass, that there is considerable penetration of the anilin.

This bottle [referring to another bottle] contains specimens that were treated with sandarac varnish. In this case I find a penetration of the anilin, though not to the same extent that was exhibited in those not treated at all.

This bottle that I open now [referring to another bottle] contains those specimens that were covered with hot paraffin. I find this the very worst specimen of all, and I am tempted to believe that the mix has been imperfect in this case, because the anilin shows from circumference to center, and the specimen is perfectly red throughout. I shall therefore take another specimen, for fear that one may possibly be defective. The next one that I break

shows a greater penetration, especially at certain points, than did the one covered with sandarac varnish. The penetration is not so great, however, as was shown by the first paraffin-covered specimen that I broke.

A MEMBER: Dr. Johnson, will you break another one?

DR. C. N. JOHNSON: Remember, Dr. Wedelstaedt is just as ignorant of what these results may be as any of us. These were all placed in these bottles on July 12, and have remained there ever since. I break another one which was covered with paraffin, and I find perceptible penetration. At Dr. Wedelstaedt's request, I shall now break another one that was treated with sandarac varnish previous to insertion in the bottle.

DR. WEDELSTAEDT: That was not varnished, but placed in the sandarac varnish.

DR. C. N. JOHNSON: This one from the sandarac varnish shows perceptible penetration.

There is one point in this connection, however, to which I wish to call attention, and that is that these experiments may be slightly misleading in one respect. These experimental fillings have been placed in the bottles and have not been disturbed. If sandarac varnish had been placed upon fillings in the mouth, or if melted paraffin had been placed upon fillings in the mouth, the effect, if any, would have been more temporary than that in the bottle because of the attrition in the mouth. The varnish and the paraffin would have been worn away, and the effect in preventing the penetration of the anilin would have been less than upon the specimens in the bottle.

I simply wish to say that I hope these experiments, as performed by Dr. Wedelstaedt, will stimulate the members of the profession to attempt similar work. There is nothing complicated about such experiments, and they are exceedingly instructive. So I express the hope that in the future we shall follow out the ideas that have been illustrated by Dr. Wedelstaedt until we know something about the materials which we are using. I should say from examining these specimens that there is not a filling among them which would be fit to use in the mouth.

SECTION III.—Continued.

Some Phases of the Cement Question.

PAPER BY W. V-B. AMES, OF THE SECTION.

I MUST at the very beginning pay tribute to the men who, by systematizing the use of such physical apparatus as the micrometer, dynamometer, and microscope, in the examination of the physical properties of filling-materials, have made it possible for me to present what is to follow.

In the consideration of the physical properties of filling-materials by various investigators, the time seems to have come for the cements to receive their share of attention. I feel justified in saying that the first really unprejudiced investigation of any moment of the physical properties of cements was begun by Dr. Wedelstaedt not more than a year since, and the publication of only a small portion of his results has awakened the profession to a realization of greater possibilities in this field.

I propose to treat as briefly as practicable the questions of crystallization of cement liquids, coarse *versus* fine powders, shrinkage and expansion of cements in wet and dry states, and the question of arsenical contamination of cement powders.

The crystallization of liquids has been the "bugbear" of cement manufacturers, especially of those who have striven to rise above the stereotyped glacial phosphoric acid product. With a liquid of that kind,—*i.e.*, one in which the phosphoric acid has been modified by sodium phosphate only,—the best results possible in the material can be achieved with a solution of a specific gravity which will insure absence of crystals in all climates and seasons, whereas if the phosphate of some metal other than of the alkaline group be

used, the problem of avoiding the crystallization of the liquid immediately enters. With this variety of liquid we almost invariably find crystals separating, which will be either in suspension, loosely settled at the bottom of the bottle, or adhering firmly to the bottom and sides of the container. While we have all no doubt had the conviction that a bottle of cement liquid in which there has been a separation of crystals was not up to its highest standard, this condition is often overlooked and the clear portion used, leaving the crystallized portion as waste. Now, in all such cases the material represented by the crystals was once in solution, and was intended by the manufacturer to be evenly distributed throughout during its consumption; so in the use of only the clear portion, the virtues of the original formula are to an extent lost.

Several efforts have been made to convert the solution into a pasty mass, which can be worked either with or without liquefaction by heat. Those needing liquefaction have been sparingly used, I think, because of their virtues not being commensurate with the annoyance; and those which work without liquefaction I have not found to possess any startling virtues. I do believe, however, that we will come to look for our best cements among those which are given to forming crystals during midwinter, and if we will take the pains to distribute the crystals so as to use them uniformly, or liquefy them by heat, if the manufacturer so directs, we will not be called on to state that the package worked well until crystals began to form; and it was then worthless, for these crystals, unless they be of the hard, glassy variety, of the alkaline phosphates, will rub down and liquefy in the mix of the cement.

Coarse *vs.* Fine Powders.

A matter of minor importance, comparatively, is the degree of fineness to which cement powders shall be reduced. While we are almost under the necessity of having it reduced to an impalpable state, in order to use it to advantage for the purposes for which it is intended, it is yet a matter of interest that in dynamometer tests of masses made up from powders of different degrees of fineness there is an increase of edge strength up to a point somewhat short of impalpability, and then a dropping off with the powder which has been reduced to what may practically be called an impalpable state.

The practical conclusion would be that if we are more interested in the strength of a contour, we can expect greater satisfaction with a powder in which a slight grit is discoverable. At the same time it seems thoroughly reasonable that this particular granular state will detract to some extent from the ability of a mass to withstand long-continued attrition as compared to one made from a nearly impalpable powder. This may need clinical demonstration.

As Dr. Wedelstaedt states, the powders of one cement can often be used to advantage with the liquid of another, and, as much powder is sent out much too coarse for inlay setting, we are apt to have some at hand suitable for contours.

Shrinkage and Expansion.

It seems advisable to consider the question of shrinkage and expansion of oxyphosphates, for fear that experiments which may have been begun and not carried to a proper conclusion may be reported and give an erroneous impression of the significance of shrinkages which take place under some conditions. In the two classes of cements to which reference has been made, there is a distinct and radical difference in the amount of shrinkage when allowed to harden in a dry state. When the crystallization has taken place with the mass subjected to water, there is an interesting modification of this shrinkage (which is often changed to an expansion) among those containing non-alkaline phosphates.

In the oxyphosphates wherein the phosphoric acid has been modified by alkaline phosphates only, the basic phosphate which is formed, and which accounts for the hardening of the mass, is of a friable nature, and is of itself a porous material; so that in agglomerating the crystals or granules of zinc oxid it exerts no special force which would result in a drawing together of the granules and make evident a shrinkage at the periphery.

In the oxyphosphates wherein the acid has been modified by *non*-alkaline phosphates the basic phosphate formed has a glassy nature, and not only agglomerates, but agglutinates the zinc oxid granules. In the previous case the basic phosphate itself becomes porous in its crystallization, while in the second case it is, as stated, a glassy material which agglutinates the granules to such an extent as to cause a drawing of them toward a center, if the composition happens to give a tendency to a diminution of volume during the

crystallization. This diminution of volume sometimes depends on a lack of water of crystallization, which if present in the composition would give too rapid setting, but which if added to the crystallizing or hardening mass will be taken up and give the difference between a shrinkage and zero or an expansion.

In the first class there is a diminution of volume which is not apparent, in a sense, because there is formed a porous material. There is shrinkage toward an infinite number of centers instead of one, as in the second class. In the second class I must reiterate; there may be diminution of volume in a dry state, and zero or an expansion by furnishing extra water of crystallization, by immersion for instance, so, as said, it seems desirable to call attention to these differences in behavior to offset the erroneous estimate which might be placed on the report of a shrinkage of cement as measured by a micrometer and observed under a microscope, if this mass has been allowed to harden in its tube in the dry state, wholly unlike conditions presented in use in the mouth.

A practical hint from these observations would be the abandonment of the idea that cement fillings of all classes of material are benefited by being kept dry for an indefinite period. It appears rather, that in the use of materials of this second class, which have decided hydraulic properties, there is a disadvantage rather than an advantage in long-continued protection from the saliva.

Arsenical Contamination.

There has been an agitation again recently of the easily demonstrable arsenical contamination of cement powders. To most practitioners whose observation has extended over ten years or more this is not an especially interesting problem, since the material has been used by them to an extent which would preclude any potency of the arsenic compound.

That the inert zinc arsenic compound might not under some unpardonable conditions be changed into potent arsenious acid I will not claim, but I have proven to my own satisfaction that the arsenic present is in combination with the zinc, and that this combination is wholly devoid of poisonous properties *per se*; and that the combination is not broken up to the extent of forming potent arsenious acid except under rare and unjustified conditions.

As a general proposition the presence of an arsenic compound in

cement powder cannot easily be pronounced advantageous, but since the process involved in assuring a product absolutely free of arsenic would assure a faint trace of the alkaline precipitant, which would detract from the integrity of a mix, I would say that the arsenical contamination is the lesser of the two evils. I feel that if results obtained by myself and others are verified by prospective repetitions, the infinitesimal arsenical contamination may be ignored.

For experiments in this direction there was prepared a compound of arsenic and zinc containing the maximum proportion of arsenic. This was gotten by heating in a sealed tube certain proportions of zinc oxid and arsenious oxid. In confinement, a full red heat will effect a thorough combination of the maximum amount of arsenic with the zinc, which seems to be about seven per cent. This is sufficient to give an extensive mirror with the Marsh test.

This combination at a full red heat is such that three thousand degrees Fahrenheit can afterward be applied to the compound in an open crucible without effecting decomposition.

This is necessarily the compound which is formed in infinitesimal quantities in the manufacture of cement powder. The consensus of opinion of expert chemists consulted is that there is formed a basic arsenite of zinc. Portions of this compound have been furnished to numerous *confrères* for experimental purposes. In my own practice its potency has been tested as favorable cases have been presented, which unfortunately do not present themselves in profusion just when wanted.

In my own tests I have been totally unable to bring about the death of a tooth-pulp by placing in reasonably close proximity a liberal portion of this zinc arsenite. One case in detail, for illustration, will answer. An upper cuspid and a second bicuspid were to be excised in the course of time in preparation for a bridge. There being no necessity for haste, and the patient being in sympathy with the experiment, the two teeth were drilled to a considerable depth, vitality being plainly evident. A liberal portion of arsenite was then inclosed. After three weeks the cavities were opened and the sensitiveness found just as much in evidence as previously. Cataphoresis was then used on the cuspid to the extent of enabling the uncovering of the pulp, which on exposure presented all of the appearances of normal vitality. Arsenious acid

was then applied and devitalization effected, as would be expected. This is typical.

The zinc arsenite has been sealed in teeth wherein the pulp might be spared, for ten days without decreasing the sensibility, and fillings inserted. A case of actual exposure, with hemorrhage, was dressed with the arsenite and left ten days, when the blood-clot was removed and a pulp stump found nicely healed.

I wish to acknowledge my indebtedness to Drs. G. V. Black and J. N. Crouse for the use of physical apparatus.

DISCUSSION.

Dr. Black: I wish to say just a word or two, and in doing so I will only detain you a few moments. For a number of years I have greatly desired that this physical examination of the cements should be made by competent persons. I have been too busy myself to make such an examination. The examinations that have been made have disclosed here to-day imperfections in cements that the profession did not know about. A considerable number of persons are working very earnestly upon this subject at the present time, in the hope of finding a cement that will be reliable. The examinations so far made do not show any cement on the market to-day that is reliable for our work, or that will do what we have expected cements to do. The examinations show that most cements are utterly unreliable, even for covering in arsenic for destroying the pulp of a tooth. My own clinical experience, which has been carried on with something like careful observation, also shows this. Unless we have a test we will not know whether our cement shrinks badly or not.

I may say from my observation of the tests that have been made in my own laboratory that some of these cements, if put in for the covering of arsenic in a cavity well prepared for this purpose, the rubber-dam being kept on for an hour or so, as sometimes happens during our operations, there will be a shrinkage sufficient to let the arsenic out upon the gums, in cavities near the gums, producing arsenical poisoning; a shrinkage that may be seen very readily with an ordinary magnifying glass.

Now, I would say that the utmost caution should be exercised in the use of cements until we can be assured that we have cements of better quality. These studies are going on and will be carried

on with great care, I am sure, and I hope it will result in our obtaining cements that we may use understandingly at any rate, whether they are better or not, so that we shall be able to understand their qualities, and be able to use them more satisfactorily than we have been able to do in the past.

DR. PATTERSON: I should like to ask Dr. Wedelstaedt a question. I am very much interested in the question of cements, and I want to ask him how it is possible for him or any other man to properly mix enough cement at one time to make half a dozen test fillings for strength. I claim that some of them would be poor affairs. I have also examined these specimen pencils of cement which he passed around to show their penetrability, and I should say that the mixing has been done in a very imperfect manner. I cannot easily see how it could be otherwise when such large masses are used. They are chalky; anything would penetrate them.

DR. WEDELSTAEDT: I do not think I should be blamed for the quality of the cements that are made and sold us. The fillings were made from a very popular cement, but at best it is nearly worthless for the purpose of making any kind of a good filling. Only one of these large fillings is made from one mix of cement. If Dr. Patterson understood me to say that five or six of these large fillings were made from one mix of cement, then he misunderstood the purport of my statement. Only one filling can be made.

DR. PATTERSON: You said so.

THE PRESIDENT: That is what you said.

DR. WEDELSTAEDT: I said nothing of the kind, Mr. President, if you will pardon me.

DR. PATTERSON: Every one says so.

DR. WEDELSTAEDT: I beg your pardon, Dr. Patterson, I said nothing of the kind. I said nothing about making six of these large fillings from one mix of cement. I spoke about making six fillings two and one-half millimeters by three and one-half millimeters. The sample fillings sent around are seven millimeters by twenty-five millimeters.

DR. PATTERSON: Did you not speak of making half a dozen fillings from the same mix?

DR. WEDELSTAEDT: Yes, in the cavity block, and I said that they had been tested in the dynamometer. That was another series of

fillings. Nobody could make six of these large fillings from one mass and mix of cement. That would be an impossibility. The condition of the cement does not answer the question. What we wish to know is, does a covering of paraffin or a coating of varnish prevent the ingress of moisture into the center of our cement fillings. The results of the experiments I have made show that neither are of any use to us for this purpose. The moisture penetrates just the same as though these materials had not been used.

Dr. Crouse: No one who has not attempted this kind of work has any idea of what labor accompanies it, the necessity for accuracy, etc., and I hope that others will take up this work. I have made some tests for shrinkage and expansion, and to my utter amazement found that a cement which was not porous would shrink, and that one which did not shrink was so porous that the ink would run through it.

My attention was first called to this by the experience Dr. Black speaks of,—the arsenic escaping. When I thought I was doing better to use cement, instead of sandarac varnish, which I now regard as the best thing with which to shut arsenic into a tooth, I found the arsenic passing through, and the patient coming in with the tongue very sore, poisoned by the arsenic undoubtedly.

Dr. Wedelstaedt: The sample fillings that were handed you to inspect were twenty-five millimeters in length by seven millimeters in diameter. Dr. Patterson has confused the sample fillings passed with the experimental ones that were tested in the dynamometer. These were two and one-half millimeters high by three and one-half millimeters in diameter. There is some difference in the size of the fillings. I have no desire to further discuss the paper or the remarks that have been made in regard to it, with one or two exceptions. As I state in the essay, I have called your attention to some weak points about the cements that are at present on the market. Now it lies in your power to have them improved. I have called your attention to the necessity for so doing; beyond this I cannot do more. It is as Dr. Crouse said, "there is entirely too much to be said about this subject."

Dr. Ames: I have very little to say in closing, except to offer a little more encouragement in the cement line than could be gotten from what was said by Dr. Black, in particular, viz,—that nobody had demonstrated so far that cement could be made which would

be impervious to moisture. Dr. Wedelstaedt stated that in making his first tests he found there was one cement which was impervious to moisture, but that particular material, unfortunately, behaves very peculiarly when it comes to the shrinkage and expansion under different conditions, wet and dry. It happens to have a composition which will give a contraction of ninety-five points, if measured in the usual steel tubes used for amalgam tests, and the same kind of a mix, allowed to harden under moisture, will swell enough to be easily observable to the eye, and from what one would know after making these tests that expansion would be over a hundred points; so it expands more in the moist than it contracts in the dry state. Now, I have reason to believe that this tendency can be overcome to a practical extent in a cement which will be thoroughly impervious to moisture and behave well otherwise. It is not at all beyond the range of possibilities.

It was in anticipation of such a report as has been made by Dr. Crouse that I gave the result of tests with non-porous cements in steel tubes and natural tooth-crown, kept under water. When conditions are analogous to those of clinical practice, shrinkages are not apparent. Expansions only are observed, which may be beneficial. I was pleased to hear the oxychlorids spoken of. Such a material as the Justi Acme (oxychlorid) I find very useful for cavity lining, especially in bleached pulpless teeth.

SECTION III.—Continued.

Susceptibility and Immunity to Dental Caries.

PAPER BY G. V. BLACK, OF THE SECTION.

THE questions of susceptibility and immunity to dental caries have not had the amount of consideration by dentists that their importance demands. It has seemed to me that it is time now that the serious discussion of these subjects be undertaken, and this short paper is intended only as the introduction of it for that purpose. My presumption is that many years of study will be required for its proper elucidation. Caries of the teeth is and has been so common and our people are so generally afflicted that most of us have seemed to regard it as common to the human race, and that practically all are afflicted. Certainly, so nearly all people, in this country at least, have caries of their teeth to some extent that this general proposition would seem to be correct. Yet there are a sufficient number of exceptions to this general rule that every one who has been long in practice has noted,—persons who have been wholly immune during a long life. In the past this immunity has been attributed to some superior quality of the teeth of these persons. The teeth themselves have been regarded as more perfect in their structure and richer in lime-salts, and the supposition has been that on this account the teeth have been able to resist decay under conditions which would destroy teeth of less perfect structure.

Recent investigations that have been conducted by myself (*Dental Cosmos,* May, 1895) and by Dr. J. Leon Williams, of London (*Dental Cosmos,* March and April, 1897), have shown that this was an erroneous opinion, and that caries is not dependent upon the quality of the teeth as to their structure or their perfect or

imperfect calcification. These facts have been so clearly set forth, the studies by which they have been determined have been so complete, and their publication has been so recent that a reiteration of them at the present time seems unnecessary. They show that all human teeth are so nearly the same in their calcification that differences in the effects of acids upon the lime-salts of the teeth of different persons are practically *nil.* They show that in physical structure there are wide differences in the teeth of different persons, both in the enamel and dentin; that while the teeth of some have enamel which is practically perfect in all its parts, the teeth of others present grave imperfections of physical structure, in that the developmental grooves are imperfectly closed, leaving fissures, pits, and openings of various sorts and shapes in its substance. Also that the dentin of some is very perfect in physical structure, while the dentin of others has many interglobular spaces in its substance, and presents granular areas in which there is much of physical imperfection. They show, further, that these physical imperfections in the teeth are in no proper sense a cause of caries of the teeth; that among persons wholly immune to caries these imperfections of structure are proportionately as frequent as among persons whose teeth decay. That even where the imperfections of the enamel are such as to form cavities in its substance reaching to the dentin, no decay has occurred during a long life. They show, indeed, that these imperfections can at most only give greater opportunity for the action of the cause of decay when this cause is present and active, and have no further relation to that cause. Therefore teeth which present the worst faults of structure may not decay, and will not decay in persons immune to caries; while teeth of the most perfect physical structure will succumb to caries in susceptible persons.

In making these statements I do not forget that the studies upon which these conclusions are based are recent (though a goodly number of the facts are old), that they are opposed to the ideas that were held previously by most persons in the profession, and that many have yet great difficulty in accepting them as conclusive. While I have much sympathy with these latter, I shall not now stop to argue this point further than to say that the facts are physical in their nature and capable of accurate demonstration, and have had this demonstration. It should be remembered that physi-

cal facts, when once reduced to laboratory forms and ascertained, remain permanent. Granite is hard as compared with other substances. It may present degrees of hardness, but no process of demonstration or reasoning can remove the fact that granite is hard. It is precisely the same with the facts I have been stating. They are physical facts, and must stand. It should be remembered further that most of the advancements made in medicine and surgery within the last half-century have been due to laboratory demonstration. Very few diseases come to be understood until their investigation has been reduced to laboratory methods. From the very nature of things this must be true, and must remain true of most pathological conditions. One might as well undertake the study of anatomy merely by looking at the outside of the man, as to try to make out a diseased condition without the aid of laboratory methods of study. It is by the use of laboratory methods that we arrive at accuracy in the explanation of the meaning of groups of symptoms and are enabled to diagnose conditions accurately.

Heretofore the profession had been looking to the teeth themselves for the answer to the question as to why some teeth decay and others do not. The facts stated above show that this was an error. In caries the teeth are acted upon. They do not themselves act in the premises. The agents acting to produce decay are outside of the teeth, and must be found in their environment. We know already very accurately what the active agents are, and can follow their action in detail in laboratory demonstration and fix all of the principal facts in their order of occurrence. The active agents are certain micro-organisms that during growth produce lactic acid, which in contact with the teeth dissolves their lime-salts; and then the micro-organisms enter the tooth-structure and gradually destroy the organic substance, breaking down the whole fabric. This was fixed by the work of Dr. W. D. Miller, of Berlin, and, while other facts regarding this process may be developed, there is not the slightest probability that these facts will be materially modified by future studies or demonstrations.

But in all of this we fail to find an answer to the questions of immunity and susceptibility of the teeth of individuals to caries. The cause which is so active in some individuals is inactive in others. The reasons for this difference in persons have not been reduced to demonstration. That the difference exists is a clinical

fact, observed and noted by every practitioner of considerable experience. We have also learned some collateral facts which influence the action of the cause of caries in a marked degree. As yet these are all clinical in character, and have about them all of the uncertainties of purely clinical data.

Observations already made render it certain that caries of the teeth has its beginning only when the conditions of the oral secretions are such that the micro-organisms causing caries form gelatinous plaques, by which they are glued to the surfaces of the teeth. This process seems necessary to the first starting of the process of decay, and until a cavity is formed by which the micro-organisms can enter the tooth-structure and be so protected as to prevent in a large degree the dissipation in the fluids of the mouth of the acid formed by them. It is well demonstrated that the whole saliva never becomes sufficiently acid to act upon the teeth, and that so long as micro-organisms have no protection from the dissipation of the acids they form they cannot produce caries. The formation of gelatinous plaques by which they glue themselves to the surfaces of the teeth and cover themselves in, accomplishes this protection until a breach has been made and the micro-organisms have entered the tooth-structure. This is well shown by the confinement of the beginnings of caries to certain selected points upon the teeth where micro-organisms may act with the least disturbance, whereas if the whole saliva was sufficiently acid to act the teeth would decay all over, instead of at selected points of beginning.

The formation of gelatinous plaques by caries fungus does not occur in every mouth, though the organisms may be growing. They do grow in every mouth, though no decay may occur. The formation or the failure of formation of gelatin seems to depend upon something in the saliva, the nature of which is as yet unknown. In growing the caries fungus artificially it can be made to form this gelatinous material or to grow without forming it, at will, by certain manipulations of the culture-medium. Yet the nature of these changes is not such as to give a clue to what may be the changes in the saliva which favor or hinder its formation. Indeed, this matter is so delicate that it is almost impossible to make two samples of broth in which there will not be differences in the disposition to form gelatin during the growth of caries fungus. I would not, however, have it understood that any and every gummy material

found in the mouth or about the teeth is the gelatinous plaques of caries fungus, for other micro-organisms may also form gelatinous masses. The gelatinous plaque of the caries fungus is a thin, transparent film that usually escapes observation, and which is revealed only by careful search. It is not the thick mass of materies alba so frequently found upon the teeth, nor is it the whitish gummy material known as sordes, which is often prominent in fevers and often present in the mouth in smaller quantities in the absence of fever.

The effect of these studies and the propositions which logically follow is to divert the search for those factors which predispose persons to caries of the teeth from the teeth themselves, where they were previously looked for, to the surroundings of the teeth, or the oral fluids and the bodily conditions which give character to the secretions. The teeth themselves are the most unchanging of the tissues of the human body, while the secretions perhaps are the least constant, and are affected by the slightest causes. For this reason fluctuation, rather than constancy, in the intensity of the action of caries is to be expected.

Susceptibility to disease and predisposition to disease are terms which are so closely allied that they may well be used interchangeably, though in certain phases of the meaning of the words a slight difference may be recognized. A person predisposed to disease is susceptible to disease, but a person may become susceptible who has not previously been disposed to disease. Susceptibility is a present condition; predisposition is something that has existed before.

I shall speak of these subjects from the standpoint of a somewhat strict family practice of forty years in one locality, in which, while there were many families that were permanent residents for the entire period, there were also many accessions from widely different portions of the country, and not a few from foreign countries. It being also an educational center, I had the observation of many young people temporarily during their school life.

With our present knowledge it may be stated that the susceptibility to caries of the teeth is influenced by heredity, by the age of the person, and by fluctuations of bodily condition.

Influence of Heredity.

I suppose the hereditary predisposition of certain families to caries has been so generally observed that it will not be questioned,

and only needs mention. In the practical consideration of cases as they are presented to us when we have the care of families of children the hereditary predisposition to caries is of first importance. When the family remains in one locality, the children living under conditions similar to those of the parents in their childhood, the susceptibility to caries will be very similar in the great majority of cases. This will hold good even to the particular teeth and localities first attacked, the order of occurrence of cavities, and the particular age at which they occur. In some of my families the first cavities in parents, children, and grandchildren were in the proximate surfaces of the upper incisors, discovered first at the age of eleven to fourteen. In the majority of families the first cavities were in the occlusal surfaces of the first molars. I had other certain families in which in the parents, children, and grandchildren the first cavities were in the proximate surfaces of the upper bicuspids, occurring at the age of fifteen to eighteen. In these the observation has been personal for the children and grandchildren, but in some cases elicited by inquiry for the parents. Over and over again decay of particular teeth occurs at a given age in parents and children. In some families it will occur a little earlier in the children, in other families a year or two later.

In those who have been changing residence, or in families that have changed their manner of life, there has not been the same close similarity, particularly as to the time of life of the beginning of decay of the teeth. It has been noted particularly in families from European countries that there have been complete reversions in which parents who were practically immune have presented me with children that were very susceptible to caries. I have noted, however, several instances in which this was reversed, so that very susceptible parents from foreign countries presented children who were insusceptible. In those cases in which there are great differences in the susceptibility of the father and mother there are likely to be sharp differences in the susceptibility of the different children to caries, some following the one parent, some the other, though in the majority of instances it seems that the inheritance is from the more susceptible parent. This observation would indicate that the predisposition to caries was rapidly increasing, and yet my observation, taken as a whole, does not warrant this conclusion. The teeth of the generation growing up now do not decay so badly as did those

of the generation of my early practice. These two statements seem incongruous. They are certainly both true. But it is also true that by better treatment latterly caries has been more closely confined to early youth, and its intensity has been diminished. The rule is that the hereditary predisposition to caries disappears with the coming of adult age.

The Influence of Age.

Caries of the teeth is, in its most practical aspects, a disease of youth. My observation of persons who have no filling done is that very few of them lose any considerable number of teeth from caries the beginnings of which have not occurred before the age of twenty years. The actual loss from caries of most of the teeth will occur later, and in many cases the intensity of the carious process will seem to be increased later, but the beginnings of nearly all the cavities have occurred early in life. In cases of great intensity of the carious process the teeth will practically all be destroyed, and at an earlier age, the greatest intensity occurring anywhere from eighteen to twenty-two or three.

The effect of early radical treatment by filling in the milder cases, and also in many of the more severe, is to change this order in such a way that at the time of life at which caries would be making its worst ravages, from twenty to thirty years, *the person becomes immune.*

This immunity relates to the beginnings of carious areas rather than to the progress of cavities that have begun. Yet in many cases the immunity extends to the stoppage of many, sometimes all, of the areas of decay which have started. This immunity to the beginning of carious areas is a feature of the abatement of the susceptibility to dental caries which must not be lost sight of in any consideration of the subject. Caries that has started and become fixed in the dentin will progress though the conditions may have become such that no beginnings of new cavities will occur. This feature of caries becomes very prominent when a large number of cases are closely followed with records that will distinguish primary fillings from refillings in cavities where fillings have failed. It becomes still more prominent when the filling is so done from the beginning that there will be no refilling. From the number of persons in whom immunity has occurred in my own practice I

conclude that this ought to become the general rule in cases in which the primary fillings have been permanent fillings. My observation in this matter includes many persons in families in whom the hereditary conditions were of the worst form. It includes cases where both parents had had much decay in their youth, and when caries had begun in the children in the same teeth, the same localities in the teeth, and at the same age as it had in the parents. But in the children, instead of increasing in intensity, there was an early abatement of susceptibility, and fewer cavities occurred than in the parents. A part of this was due to better care. But, again, this better care was due to the better conditions attained, which rendered the better care possible. By better methods of operating the teeth were kept in full and natural use in the mastication of food, and had the natural abrasive action of the excursions of food over their surfaces and the surfaces of the gums about their necks with its effect in natural cleaning. This had its salutary influence, and I regard this preservation of the complete and free use of the teeth in the mastication of food without hindrance from lodgments about the teeth or from pain as the most important element in bringing about an early abatement of susceptibility to caries.

At first glance this influence would seem to be local only, but it seems to me that there is a general influence as well; an influence which reacts in a general way, producing a better condition of the secretions and of the cellular elements of the whole person. But the principal factor is to preserve good conditions and maintain healthy, vigorous employment of the teeth, and thus be ready for and encourage that immunity which comes with adult age.

Continuance of Hereditary Predisposition.

In a few families the hereditary predisposition to caries continues into middle and advanced age. These may usually be known by getting the history of the parents and the grandparents, noting where possible the character of the operations they may have had for relief, and dividing the primary fillings from refillings. There are so many cases in which persons are continually having cavities refilled when fillings fail, that unless the refilling is eliminated and only new cavities of decay considered we are likely to be deceived and to regard the case as one in which the predisposition to caries is continuing, when, as a matter of fact, no new decays have been

starting for many years. When the filling has been so done that there will be no refilling, the cases are easily made out. This should be closely looked to in all such examinations, if we would obtain a correct view of the future probabilities in the children we are to treat.

A case in point I will relate as illustrating this class of cases. A little girl, twelve years old, came into my hands with cavities in all of the first molars. The molars and bicuspids of the father were wrecked so badly by caries that I had removed them and advised that artificial teeth be not substituted for the time, throwing the whole effort of mastication upon the incisors and cuspids, which at that time presented only a single primary cavity. The mother had had much filling done, also confined to the molars and bicuspids. None of it had stood long, and decays were then starting in several of the incisors, both upper and lower, at the age of thirty-one or two. Both of her parents (the grandparents of the child) had lost their teeth from caries.

This made up a wretchedly bad history for the little patient that attracted my attention strongly even at that time, which was early in my practice; and I may say that I made special effort to conduct her case well, an interest that I never lost. In the lower first molars the pulps gave trouble and were lost three years later, and in about fifteen years the crowns of these teeth broke down. Other than this she has never lost a filling. Her fillings make a long list on my record books. First the occlusal surfaces of the molars and of the bicuspids; then the proximate surfaces, all of them, one by one; then the buccal surfaces and several lingual surfaces. At the age of thirty-four the first proximate decay occurred in the upper incisors. At the age of forty-five all of these and the proximate surfaces of the cuspids had cavities, and were filled in turn. And the last were the labial surfaces of the incisors. I have never seen a mouth that was naturally more cleanly, or one that was better cared for by the patient than this one. In form the teeth were fine, long, and bell-crowned, with excellent alignment and occlusion. The whole denture was ideal. The patient was practically never out of health. She led an easy life, but a life of fairly keen interest in her friends and surroundings. She married late and has no children.

And yet with this history new decays were starting persistently.

It is the most marked case of the persistence of the tendency to caries upon my records. In this case there never was a time that caries was allowed to run on to such a degree as to increase susceptibility because of the presence of troublesome carious cavities, except very temporarily with the lower first molars. At all times the patient could chew her food comfortably and take proper care of her teeth. The slowness of the occurrence of cavities was in marked contrast with some other cases in which cavities occur in all of the teeth almost as rapidly as they appear through the gums. It is the persistence in the beginning of decay in group after group of localities in regular succession to which attention is called, and it is that which marks the case as bad in its general character.

In another case presenting a similar history upon the side of the father and grandfather on the father's side, but something approaching immunity in the family history of the mother, a little girl, eight years old, presented cavities in the occlusal and mesial surfaces of all of the first molars and proximate cavities in the upper incisors. Other cavities occurred in the teeth taking their place later, almost immediately they were in position. All of these were filled as soon as they were discovered. No temporary fillings were employed for more than one or two weeks. Mastication was never hindered; there never was a refilling, and now, at twenty, a condition of immunity seems to be fairly established. This immunity was the object sought, and which should be sought in every case. In a case of such grave predisposition to caries as this, to resort to temporary fillings that in themselves are not as radical as is required for permanent ones is almost equivalent to losing the fight. Fillings of such a character that caries will recur, or of such forms of contact points, shapes of interproximate spaces that lodgments will occur, or any conditions limiting the use of the teeth in mastication, will allow the persistence of caries, increase its intensity, and delay the coming of immunity; while the opposite condition of freedom from progressive caries, the maintaining of perfect contact points, freedom from lodgments, and continuous, full, free, and effective use of the teeth by favorable reaction upon general bodily conditions diminishes the susceptibility to caries and hastens the coming of the condition of immunity. In such a case half-hearted operating is of no use. The filling must be well done in every particular. The cutting of cavities must be full and free, with the proper exten-

sions for prevention. All decay must be removed completely, the fillings so seated and the retention sufficient that the fillings may withstand the force of mastication; and, finally, the gold must be so well packed to the walls and margins as to prevent leakage absolutely, and be made sufficiently dense and hard.

In the ordinary cases presenting medium intensity of the carious process the same results are obtained with greater ease to both patient and operator. But this result is easier because less effort is required. The effort should be of the same quality throughout our practice with children. Note particularly that it is for children that the most perfect operating is required.

In cases of milder types of susceptibility, in which the beginnings of decay are fewer in number and the progress slower, the coming of immunity with increasing age is more certain, and the detail of operations, while more or less exacting, is easier carried out, because it brings less of wear and tear to the patient. Especially it is easier to maintain the full, free, and efficient use of the teeth. My observation is that a failure of vigorous mastication delays the coming of immunity seriously. In families where I have succeeded in this in cases of medium hereditary susceptibility, immunity is usually ushered in with adult age. Relapses of short duration occasionally occur, but are easily managed.

Can Permanent Fillings be Made for Children?

On the question of making permanent fillings for children I have been sharply criticised.

The contention has been in part that teeth that have only lately taken their places in the arch are not sufficiently strong in their calcification to receive permanent fillings. That this contention is wrong is firmly answered by laboratory examinations, which show that the calcification is so complete that in this respect no difference should be made between the teeth of children and the teeth of adults. Clinically the answer supports the practice and adds diminished susceptibility in its favor.

The contention has been in part that the peridental membranes are not sufficiently strong to bear the necessary force. As to this, I often see these same children crack nuts upon these teeth which when placed in the dynamometer show that a force of from sixty to one hundred pounds or more has been used. I should never

use more than forty pounds in the operations, and but rarely more than twenty-five pounds. Then, again, it is said that the pulps are still large in children's teeth, and there is more danger of approaching too close to them in forming cavities. This is correct, and corresponding care and judgment must be used.

Will the courage and endurance of the child suffice for these operations? This is the point upon which more depends than all else, and the one which will prevent permanent operations being undertaken in some cases otherwise favorable. Yet this difficulty may generally be overcome by judicious management. If proper means are employed the endurance of the child will generally be sufficient. *But whatever else is done, or left undone, the courage of a child should never be broken down by overtaxing its endurance.* To do this practically ends the fight in failure. Precisely the same should be said of the nervous system of the child. These should be looked to with the greatest caution. Generally both may be maintained and the necessary operations properly performed, but not always. Cases will come to us in which this seems to me impossible. In such the cases must be tided along by palliative and temporary treatment at any risk until better conditions can be had. *One should never attempt permanent fillings under conditions which render perfect work impossible.*

The worst forms of cases that come to us are those in which caries has made such progress that the teeth are already practically out of use in mastication. In these cases the peridental membranes will be so sensitive to pressure as to render permanent operations impossible. There is no other course open but palliative and temporary treatment until full use of the teeth in the mastication of food is restored and the peridental membranes have recovered their normal condition. Nothing else than the full, free use of the teeth will restore the tone of their membranes. When this is accomplished and the teeth are again in full vigorous use, the operations should be proceeded with without delay. This applies to all patients, adults as well as children.

Fluctuations in Susceptibility to Caries.

The acute observer of considerable experience may readily observe that in all of the milder types of the tendency to caries of the teeth fluctuations are occurring between susceptibility and

immunity. Persons who have had a number of cavities develop and had them filled go on for a time, it may be for several years, with no new cavities starting, and then suddenly a new crop of cavities begins. This new susceptibility may continue for a time, and the patient will again show immunity. This may be repeated at intervals. I have noted this kind of fluctuation so frequently in my own practice that I feel that I cannot be mistaken about it. Also in the literature many cases have been cited in which persons have passed a number of years without new decays, when suddenly the teeth were found decaying rapidly. These I believe to be instances of the same fluctuations between susceptibility and immunity that I have myself observed.

A case in point is this: A little girl of fourteen had a number of cavities. These were filled, and during the next three years a number of new cavities occurred. Then immunity seemed established. No fillings failed, and no new decays occurred until she was twenty-eight. Then several new cavities occurred and two proximate fillings failed because the cavities had not been sufficiently extended. The next year two more cavities were found. Then there was complete immunity for ten years more, when suddenly there occurred another crop of cavities. This patient came regularly for examination during all of these years, and I feel assured of the meaning of this history. There are many such. In several cases I have seen caries occur first in middle life, the persons having been strictly immune throughout the period of childhood and youth. Still more rarely caries occurs first in old age.

These fluctuations are not dependent upon conditions affecting the general bodily health in any analysis that I have been able to make of the cases that have been under my care. Persons out of health are not especially liable to become susceptible to caries on that account. Persons in certain vocations are more liable to continuance of caries, as millers, candy-makers, and workers in starch or sugar. In the very nature of things, as well as in the light of physical examinations, these fluctuations between susceptibility and immunity cannot be from changes in the tissues of the teeth, for these are the hardest tissues of the body and the least subject to change. The whole range of facts bearing upon this question points to changes in the environment of the teeth, to the changes in the secretions, and possibly of the cellular elements of the general

body which cause these changes. These changes in the secretions seem to have nothing in common with changes in the general health, and are not markedly influenced by them. They are often coincident with what seems to be the best of health. They are also frequently coincident with ill health, and many cases related in our literature would seem to connect them with ill health of sometimes one kind and sometimes another. These I have often seen, but, taking the mass of observations together, I am of the opinion that they are merely coincidences, and that there are no especial forms of ill health that particularly predispose the teeth to caries.

Local Immunity.

Local immunity from caries in mouths in which caries is progressing is constantly before us. When we take account of those positions upon the surfaces of the teeth where caries is liable to attack them, and in which we are constantly observing the attacks of caries, we see at once that there are widespread local immunities of regions in every mouth. In this case caries is destroying the bicuspids and molars, leaving the incisors untouched. In a second case the upper incisors are being destroyed, leaving the molars free. In many instances the proximate surfaces are attacked, while the buccal and labial surfaces are free from caries; while in a certain proportion of cases it is the buccal surfaces that suffer especially. Can this be on account of differences in the tissues of the teeth in these special localities? Is not the cause of this difference much more likely to be found in the environment of these particular localities, to something in the position that favors the building of microbic plaques in the one place and is unfavorable in the other?

Then, again, we find when we follow carefully the history of certain families that cavities in these several parts of the crowns of the teeth occur in succession, following each other as each particular group of positions becomes susceptible. In this family cavities occur in the proximate surfaces of the molars and bicuspids at the age of fourteen to eighteen, and in the same mouths we find a crop of cavities occurring in the buccal surfaces of the same teeth at the age of twenty to twenty-five. In another family the order of the occurrence of decay in these localities will be entirely different.

In persons who have no filling done, and in whom caries has not been very severe, we find that some certain teeth are lost, but that carious cavities in others cease to progress and remain stationary

for many years or during life. Caries may even progress and destroy other teeth while these still remain stationary. The locality has become unfavorable to the progress of caries because of some change in its environment, and decay has ceased. This condition is very generally present in those cases in which very old leaky amalgam fillings have *"saved the teeth for forty years or more."* If these fillings had fallen out five years after they were made the teeth would have been saved all the same, because of the immunity of the locality. Such fillings do not protect from caries when the susceptibility is at all considerable; and without careful consideration of their environment and comparison with what occurs in conditions of susceptibility to caries our clinical experience will lead to conclusions very wide from the facts.

Dr. Crawford: Mr. President, from a moral and philosophic standpoint the paper that Dr. Black has just read and the one in the hands of C. N. Johnson are so nearly alike that the Chairman of Section III asks the unanimous consent that Dr. Johnson read his paper now, and that the two be discussed conjointly.

The President: If there is no objection, this request will be granted.

SECTION III.—Continued.

The Management of Children's Teeth.

PAPER BY C. N. JOHNSON, OF THE SECTION.

THIS subject presents itself in two phases for our consideration from an operative point of view,—the care of the deciduous teeth, and the care of those of the permanent set which may be said to appear in childhood. The problems which confront the operator in the one case are not precisely the same as those in the other, and the intelligent practitioner will study the two situations from a somewhat different basis. The object in the management of the deciduous set is merely to do palliative work, with the idea of keeping the patient comfortable for a period of a few years, rather than to undertake thorough, permanent, and artistic operations. The avoidance of pain at this age is very important, and this of itself often involves the performance of temporary work. While the operator is not by any means free from this restriction in his management of the permanent teeth, particularly those which appear early, yet his aim as he approaches these should be in the direction of attaining the greatest possible permanence to his operations, with the idea ever in mind that the highest possibilities of his art involve the saving of these organs for a lifetime.

MANAGEMENT OF THE DECIDUOUS TEETH.

The impression among many of the laity that these teeth may well be neglected, so far as operative procedures are concerned, on the basis that they are eventually lost through natural processes, should be corrected by the profession at every opportunity. Beyond the patent fact of much possible suffering on the part of the patient and much injury to the health through neglected and abscessed

teeth, there is a question of habit which would seem to have an important bearing on the future welfare of the patient. These little folk are very impressionable at such a tender age, and readily acquire habits which may conduce to either their permanent benefit or injury. If a deciduous tooth decays and is allowed to go without attention, it sooner or later becomes sensitive to the impact of food in mastication, and the little patient often, without being able to explain the real source of the discomfort, intuitively avoids chewing upon the side of the mouth affected. This leads to imperfect mastication, and where there are several sensitive teeth in the mouth it may lead to an almost entire cessation of mastication; so that a process of bolting the food is inaugurated which may, and undoubtedly often does, cling to the patient as a habit through life.

If a close observer will carefully note the workings of mastication in the mouths of the individuals he meets, he may of course get a reputation for rudeness, but he will also be impressed with the variations in the methods practiced and the degree of effectiveness exemplified in the different mouths. These variations occur in individuals who have teeth of relatively equal efficiency, so that they must be traced largely to matters of habit; and it is natural to conclude that these habits were formed in childhood. When it is considered that effective mastication is a weighty factor in the health and longevity of the individual, it may be seen how important it becomes that we keep the teeth of children in a condition comfortable under the trituration of food and conducive to habits of thorough mastication.

A child should be brought to the dentist at regular intervals for examination from the time of the third, or at latest the fourth, year of age. The first operation usually necessary is fortunately that of cleaning the teeth, and this may be accomplished as a sort of a frolic on the part of the little patient and without any pain. If the teeth are cleaned several times before any filling becomes necessary the dread of the dental chair is largely overcome, and filling operations are undertaken with a better prospect of success.

The materials to be used for filling the deciduous teeth are ordinarily limited to gutta-percha, cement, and amalgam. For the anterior teeth cement must be considered the chief reliance, on account of the nature of the decay which usually attacks these teeth. The cavities are for the most part shallow and not well

defined in outline, nor is it possible in many instances to establish a perfect outline or trim to a well-formed margin. After the removal, more or less thoroughly, of the decay, the filling must be plastered against the decayed surface and remain of its own adhesive properties. Cement is the only material which can be relied upon to do this, the fact that it is necessary to renew it occasionally being its chief limitation. It is ordinarily not a very difficult problem to save the deciduous incisors and keep them comfortable till the eruption of the permanent ones, on account of the early age at which they are shed; but the care of the deciduous molars becomes a more serious matter. They are usually retained four or five years longer than the incisors, and those years are sometimes very trying both to patient and operator. Occlusal cavities in these teeth are ordinarily easily managed with either cement or amalgam, the choice being governed by the degree of thoroughness with which the cavity may be excavated without pain. If a good preparation can be made, and the pulp is not too nearly involved, amalgam should be used on account of its greater permanence, but in some instances the teeth are so sensitive that the most that can be accomplished is to break down the thin overhanging enamel-walls, remove the softer portions of the carious dentin, and force cement into the cavity. When cement is used under these conditions it should be placed in position with considerable pressure. It should also be used in such excess that the entire occlusal surface of the tooth is covered even beyond the borders of the cavity, so far as this may be done without interfering with the occlusion. To accomplish this conveniently, and also to protect the filling from moisture for a few minutes without stuffing the mouth full of napkins or absorbent rolls, the index finger of the operator may be brought down upon the cement as it lies on the tooth and the whole occlusal surface subjected to pressure, so that the cement will be forcibly carried into every groove or inequality on this surface and the excess be squeezed out over the marginal ridges of enamel. If the finger be held upon the cement a few minutes the result is a filling which not only includes the cavity itself, but also protects the grooves and other vulnerable points radiating from it.

The problem of chief concern in the care of these teeth relates to the management of occluso-approximal cavities. There are two factors which tend to make these cavities especially difficult to con-

trol,—the almost universal sensitiveness which we find present, thus preventing an adequate preparation of the cavity to retain the filling, and a gradual separating of the teeth from the natural expansion of the jaw, so as to lead to constant complaint on the part of the patient of food wedging between the filling and the approximating tooth and lodging in the interproximal space. This discomfort is often manifest as the teeth drift apart, even when no decay has occurred, but it is particularly annoying between filled teeth where it has not been possible to contour sufficiently to maintain perfect contact with the approximating tooth. The insecurity of anchorage usually imposes upon the operator the necessity of making fillings with limited contour, and this soon leads to a pocket between the teeth, which proves a constant source of discomfort.

Ordinarily where the approximal surface of a molar is decayed the approximating surface of the one next to it also becomes involved, and this complicates matters so far as making separate fillings is concerned. In desperate cases, where both teeth are decayed, it may be advisable to bridge across the interproximal space and join the fillings together. This will at once do away with the difficulty of food wedging between the teeth, and will often prove a relief to the patient where separate fillings have been a failure. But there are only two materials which are suitable for this purpose. If cement is employed it is only a matter of a few weeks when the whole mass is found loose between the teeth, so that the operator is limited to gutta-percha and amalgam. If the former is used it will ordinarily not draw away from either cavity, and it is excellent as a temporary expedient, but it is so easily worn out that it is at best only a makeshift. Amalgam is probably the most serviceable material for these cavities. It is not worn away by attrition, and will remain more securely fixed than cement, though in some instances the case will present in a few months with the filling loosened from one of the cavities while the other remains firm. The reason for this lies in the individual movement of the teeth, the one with the lesser retention giving way.

A great aid in securing firmness of these fillings when joined together, no matter which material is used, is to first place a metal bar across the interproximal space, with one end resting on the cervical wall of one cavity and the other on the cervical wall of the other, and building the fillings around and over it. This locks the

teeth together more securely, and affords perfect protection to the gum. These bars may conveniently be made from German silver wire rolled flat, and cut to a suitable length for the case in hand.

Treatment of Exposed Pulps in Deciduous Teeth.

When a pulp becomes exposed in a deciduous tooth, it is seldom advisable to make an application for its destruction. If the patient applies with pain this can ordinarily be quickly relieved by syringing the cavity well with tepid water to remove loose *débris,* and carefully clearing away with a spoon excavator any hard material which may be causing pressure on the pulp. This is to be followed by an application of oil of cloves on a pledget of cotton about the size of the head of a pin, covered with dry cotton to fill the cavity. When the pain is relieved, it is better to treat the tooth in a palliative way than to subject the pulp to the action of drugs sufficiently powerful to work its destruction. Arsenic should never, under any circumstances, be used in a deciduous tooth. The risk is too great of doing serious injury to the surrounding parts, and the necessities of the case seldom call for any such radical treatment.

An exposed pulp may be treated by flowing over it a paste made by mixing oil of cloves with the oxid of zinc or the powder which comes with cement fillings. This paste is anodyne and antiseptic, and a pulp will usually remain comfortable under it. It should be protected by a filling of gutta-percha or cement. If a pulp has begun to suppurate, this paste sealed in with soft gutta-percha is an excellent means of keeping the tooth comfortable while the pulp is dying. It may be left in under these conditions for a week or two, as the case indicates, and on its removal the canals can ordinarily be cleaned and filled with safety. It will usually be found that when a pulp has once become exposed in a deciduous tooth it is only a matter of time when it will die. These pulps do not seem to be very tenacious of life, and it does not require an application of arsenic to kill them. They will often die even under this antiseptic paste, but when protected in this way they seldom give the slightest discomfort while dying, and the tooth will often remain free from pain till it is shed. In other cases it may become somewhat sore following the death of the pulp, and even end in a small abscess opening on the gum; but there is never the intense suffering and excessive swelling which sometimes accompanies teeth that are neglected and left open to the fluids of the mouth.

Treatment of Abscessed Deciduous Teeth.

The canals should be as carefully cleaned as possible by mechanical means, and then packed with cotton saturated with oil of cloves. Some unvulcanized rubber sufficient in size to fill the cavity should then be forced down upon the cotton, and compression made on the rubber till the oil of cloves comes out the fistulous opening on the gum. When this is accomplished, if the preliminary cleansing has been thorough and the contents of the canals have not been too offensive, the tooth may be filled at the same sitting. If the dentin seems saturated with foul matter, the canals should be packed with cotton and oil of cloves and sealed with gutta-percha for a week. If the fistula still remains open at the end of that time, it should again be injected with oil of cloves and the tooth filled in the following way: The pulp-chamber and canals should be flooded with a solution of gutta-percha in eucalyptol, and some temporary stopping slightly warmed should be forced down into each canal till the eucalyptol solution shows at the opening of the fistula. The temporary stopping should be left in the canals as a root-filling, and the cavity proper may then be filled with whatever material is indicated.

Following this treatment, these cases will almost invariably heal and give no further trouble. Indeed, the management of abscessed deciduous teeth is usually a matter of not much difficulty, provided the patient is at all tractable and there is enough of the tooth left to work upon.

The Management of Permanent Teeth in Childhood.

This is one of the most important problems in the entire practice of dentistry. Decay of the teeth has been called essentially a disease of youth, and it is undoubtedly true that during childhood it seems to make its fiercest attacks. The teeth to suffer most from its ravages are accordingly among those which erupt earliest, and of these may be mentioned particularly the first permanent molars. These teeth should be the object of especial care on the part of the dentist. Beyond the fact that they are called upon to do longer service in the mouth than any of the other teeth, they have an important function in the dental arch which is not often carefully enough considered by practitioners. This relates to the time of their eruption and to the position they occupy in the arch. To them it is given to be the standard-bearers of the jaws during that period

which intervenes between the loss of the deciduous molars and the growth to full length of the bicuspids and second permanent molars. Without the first permanent molars in their proper position at this time the jaws are allowed to drop too close together, so that the upper incisors overlap the lower incisors more than is normal, and the bicuspids and second molars are never allowed to assume their true length and position. This matter of maintaining the jaws in their proper relation one to the other is very important, as it relates to the symmetry of the face and to the most perfect mastication, and every effort should therefore be made to preserve the first permanent molars in their normal length. These teeth should be watched from the time of their eruption, and on the slightest approach of caries they should be carefully filled. In case the patient fails to apply to the dentist till decay has so involved the teeth that they are badly broken down and not capable of maintaining the jaws in their correct position, every effort should be made to so build them up with fillings that this function be not lost, and, failing in this, they should be crowned even at this early age rather than yield them up to the forceps.

The choice of materials to be used for filling these teeth in the early history of their eruption must be governed largely by the ability and disposition of the patient to withstand dental operations. If decay occurs on the occlusal surface during the period of the tooth's eruption through the gum, as is sometimes the case, the most serviceable material to check the disease at this time is usually cement. It may be employed with less thorough preparation of the cavity than is demanded for metal fillings, and it will prove effective as a temporary expedient to tide the tooth over this critical period till it is fully erupted and in a condition to receive a more permanent operation.

This material may be used in the very earliest stages of decay, even when the flap of gum has not entirely receded from the occlusal surface; and in some mouths where the tendency to decay seems to be very great it is well to use it as a preventive by forcing it into the grooves and sulci of the occlusal surface before actual decay has begun.

This will often so protect the surface during the eruptive period that decay will be avoided. When the occlusal surfaces of the teeth of the two jaws so approach each other that they are subjected to

the friction of mastication the tendency to decay is thereby materially lessened, and it is consequently a matter of much moment to prevent decay till this takes place. The cement may conveniently be forced to position by the finger of the operator, as was advocated in the treatment of deciduous teeth, and considerable pressure may be brought to bear upon the filling-material, so that every indentation on the occlusal surface is perfectly filled. This, while it may not be considered a very elegant method of operating, is assuredly a most effective one, and in this instance utility is paramount to elegance.

In cases where occlusal cavities have been filled in this way with cement the teeth should be examined every three or four months, and metal fillings inserted as soon as the cement wears away and the conditions in the mouth make it possible to do more permanent work. These conditions relate to expediency of operation and to the increasing fortitude on the part of the patient to withstand the tedium and pain necessary, rather than to any pronounced change of structure in the teeth. That a change does take place progressively from youth to age is without question, but it is neither so radical nor so rapid that it need be accounted an important factor in the selection of a filling-material. Dr. Black has shown conclusively that all enamel and all dentin is harder at any age than any of our filling-materials, and this should be sufficient to settle the question so far as it has a bearing on the choice of material. If tooth-tissue is found which is softer than the materials we use it is due to pathological conditions aside from dental caries, and need not be considered in this connection.

As to the choice between gold and amalgam, this should be governed by two considerations,—the one of expense and the one of an adequate endurance on the part of the patient to submit to gold operations without undue nervous strain. It should be the aim of all operators who take pride in their work, and who wish to do the most permanent service, when they have the care of the teeth from childhood, to keep amalgam out of the mouth entirely, but this does not seem in all cases to be possible. We must not jeopardize the nervous system of our young patients in the blind effort to live up to some high ideal, no matter how beautiful it may appear to us. Neither will it do to affirm that gold should never be used under a certain age, say the age of twelve, as we have so often heard. It

is not a question of age at all. It is a question of temperament, a question of physical and mental stamina on the part of the patient. Some children at a given age have much greater capacity for enduring operations upon the teeth than have other children at the same age, and every operator should make a careful study of this matter among his patients.

A very useful material for filling these occlusal cavities where the area of the cavity is not too great is a combination of gold foil and tin foil rolled together. This can be used when the gold operation would be too exhausting, and if properly manipulated it will prove a very satisfactory and often a very permanent operation. With an operator who is familiar with its manipulation it may be inserted so rapidly that it is seldom necessary to apply the rubber-dam, and this of itself is often an important item in the management of children's teeth. It is especially indicated in occlusal cavities of upper molars and bicuspids, the lower molars ordinarily calling for fillings too great in area to make this material serviceable. It cannot be depended upon to wear well in cavities with a broad masticating surface.

There is one point upon first permanent molars which calls for the most careful attention in the early period of their eruption,—viz, the mesial surface. This surface is in contact with the second deciduous molar for several years before the loss of the deciduous teeth, and if the tendency to decay is great in that mouth, or if the deciduous molar is affected on its distal surface, the first permanent molar is almost certain to suffer. It is well in many of these cases, as soon as the permanent tooth is fully erupted, to grind away the distal surface of the deciduous tooth so that there is only a narrow contact between the two. In this way the mesial surface of the permanent molar is more readily kept clean.

In case decay occurs on this surface, it may ordinarily best be controlled during the presence of the deciduous teeth with gutta-percha. If a sufficient depth of cavity cannot be gained to secure the gutta-percha to place, it is best to flow cement over the surface as a temporary expedient, though cement on these approximal surfaces must not be depended upon for any length of service. The patient should be instructed to report immediately on the loss of the deciduous molar, and whether the permanent tooth has been filled with cement or gutta-percha it should at that time be replaced

with gold. This can be done to better advantage before the eruption of the second bicuspid, when the mesial surface of the permanent molar is freely presented to the operator, than at any time subsequently. At this sitting every vestige of affected enamel should be included in the cavity, and the metallic surface be made sufficiently broad to render the operation as permanent as possible.

In cases where the approximal surface is so decayed that the occlusal surface becomes involved before the operator's attention is called to it, the best temporary filling is ordinarily to be found in a combination of gutta-percha and cement, laying gutta-percha over the cervical third of the cavity and completing the filling with cement. The latter will probably require occasional renewal, but the gutta-percha will ordinarily last till the patient is in a condition to have gold inserted.

The care of permanent incisors in the mouths of children is a matter calling for careful consideration. If decay occurs very early, it is usually best to resort to cement or gutta-percha, instead of attempting permanent work at the outset. The choice between gutta-percha and cement must be governed by the nature of the decay. If there is sufficient penetration to securely hold the gutta-percha in place, it may be depended on for more permanent work than cement, but in shallow cavities, too sensitive for much cutting, the cement may be maintained in place more readily than gutta-percha. Neither of these materials need be considered in the light of anything but temporary expedients, and the patient should be carefully studied and judiciously schooled toward an attitude of sufficient fortitude to submit to gold operations as early as may seem practicable. The date at which gold may be substituted for the other materials must depend on the sensitiveness of the teeth and the ability of the patient to submit to thorough work without too much nervous tax. It is folly to attempt to insert gold while the patient is so illy under control that perfect work is impossible, as it is also wrong to defer longer than necessary the insertion of a reliable material like gold and leave the teeth to the mercy of materials long since proved to lack permanence.

Dr. Crawford: I understand Dr. Truman has a paper that would properly come in now.

Dr. Truman: I am sorry that my paper is called for at this

time, because I should like to have the papers discussed which have just been read. To me they are both radically wrong, and I should like to have an opportunity to express that opinion more fully. When I say, "radically wrong," I do not differ from Dr. Black in some of his points; but as a whole the last essay is so entirely dogmatic in its assertions that I think it ought to be answered. I will, however, read my paper.

SECTION VII.

*Reflexes from Lower Molars.**

PAPER BY JAMES TRUMAN, OF THE SECTION.

THE causes of reflex disturbances have been sufficiently studied as a collateral branch of dental pathology, and it may seem a useless expenditure of the time of this organization to attempt to add anything to the literature of the subject.

When the student of dental lesions comes to investigate the various books that are supposed to treat upon the reflexes of the teeth, he finds himself narrowed down to a small compass. He may critically examine all the works on dental pathology and oral surgery issued in the English language in recent years, to be surprised with the fact that where this subject received extended notice it has been mainly confined to infantile dentition, or it has been regarded as of secondary importance; and by some it is held to be one unworthy of pathological consideration.

The eruption of the permanent molars, aside from their histological interest, has secured but slight attention. It is true that the consideration of the intimate connection between the lesions occurring in teeth and the neuroses of the fifth nerve have of recent years been more thoroughly studied, but it has been more from the histological side; hence formations in the pulp, as these enter into daily practice, have received a full degree of attention from dental writers. The exceptional conditions are, however, passed by as of minor importance, or they have been entirely overlooked.

It is somewhat strange that the lesions of dentition have been treated by the majority of medical writers with slight consideration. The opposition of the medical to the generally accepted position of

* Presented by Section VII, but read and discussed at this place.

the dental profession, that the reflex disturbances of dentition are of vital importance, can be understood, for medicine until very recently has entirely underrated, if it has not entirely ignored, the oral cavity as a source of disease. This should not, perhaps, be regarded as remarkable, since the origin of disease in general has only been studied scientifically during the past twenty-five years, and is even now in its infancy. Medicine has been based upon symptomatology; the effect, and not the cause, receiving much attention. It is therefore not a special source of wonder that the neuralgias, the tissue disturbers, the new foci of inflammation having their origin in the teeth, have received only a moderate degree of thought. While this is true of medicine in general, the specialist, the stomatologist, must share the responsibility of neglect.

The views that this paper proposes to consider are, in the main, written to enforce the idea that more attention should be given to the eruption of the molars than has been accorded them. The same laws of growth are manifested here as in the first dentition, and are equally responsible for serious disturbance along the course of nerve connections. Consideration will alone be given to the lower molars, for the question of growth does not apply with equal force to the upper set. It is, however, recognized that nerve irritation proceeds from these as it does from all the teeth disturbed from their normal relations.

The process of growth, whether in vegetable or animal tissues, is one of the most interesting in nature. John Tomes ("Dental Physiology and Surgery," 1848) in writing of this force says, "It would be difficult to estimate the actual amount of mechanical force developed by a growing tooth, but we may form some estimate by observing the force generated by a growing vegetable." If this force of growth be applied to the teeth, and it must be so applied, it can be well understood why in dentition reflex disturbance occurs. The whole question of treatment might be condensed into the word *room*. With space sufficient for the development of teeth, all dentition would simply be a physiological and not a pathological process. It is therefore a question of space or room for development.

Growth proceeds from the first layer of enamel and dentin to the last of cementum, and in proportion as the enlargement proceeds must the teeth be given space for their formation; and to accomplish this, the gumward advance must be regular and with no

opposing obstacles. In deciduous dentition these are confined to the gum-tissue, and these teeth are, equally with the permanent, a source of reflex disturbance.

The student of these phenomena has, therefore, a comparatively simple problem to solve. His duty is first to study the anatomy of the jaw and the process of growth in the jaw primarily, and to follow this by that of the teeth. He cannot omit in this consideration the position of development and the resulting changes that take place in its progress.

The beginning of development of the first permanent molar takes place about the tenth week of fetal life, and from this period until the sixth year subsequent to birth it is gradually formed into the largest molar of the series. The broad occlusal surface of this tooth would seem to indicate that at this period of eruption it would be a special subject for pathological disturbance, but, as is well known, it is less frequently a source of reflex disturbance than any other of the developing permanent teeth in the inferior maxilla. If the jaw has been examined it will be found that this exemption is clearly explainable by the width of the jaw, measuring from the overlying gum-tissue to the inferior dental canal. The only obstruction to receive serious consideration is the tense overlying gum. This, while resistant, gradually yields to pressure, resorption taking place; and, while it may retard eruption, it cannot as a general rule cause pressure upon the exposed pulp, or upon the inferior dental nerve. Hence there is a marked and almost uniform freedom from neuroses in this tooth, and it may be passed as an unimportant factor in pathological disturbance.

The second, or, as it is commonly misnamed, the twelfth-year molar, has an entirely different place in development, and in consequence more fully exemplifies the importance of room for growth than any of the series, not even excepting the third molar, which is usually regarded as the prime factor in neuralgic lesions. In an extended examination of the literature of the subject, nowhere have I found this tooth noticed as a cause of reflex conditions. It is therefore worthy of study in its several relations,—origin, development, and eruption.

The growth of the jaw posteriorly carries the germs of these teeth well up in the rami, and as development proceeds, both in jaw and teeth, there is a gradual descent toward the angle of the jaw. The

period of passing this point, through development of the latter, to assume the direct vertical position is the critical period. At this time the crowns are fully formed externally, and the roots have developed to half their normal length. If the growth of the jaw is in harmonious relation to the development of the teeth this period may be passed without notice, but this is not always the case. The growth of the roots may have progressed more rapidly than that of the jaw, and in passing the angle they may, and frequently do, impinge upon the inferior dental nerve; or the exposed pulps may possibly be forced by the exceedingly tense gum against the bone envelope, in either case resulting in serious reflex suffering to the individual. The passage of this critical point by these teeth occurs about the ninth year.

The characteristic phenomena at this time are marked cerebral disturbance, resulting in convulsions, epilepsy, chorea, insanity, hysteria, otalgia, ocular diseases, and a long list of more or less aggravated lesions. In the before-mentioned work of Tomes the author gives this as his opinion on reflex manifestations: "Before serious and painful results can arise there must be a concurrence of many circumstances. The patient must be of a strumous constitution or predisposed to inflammatory action, or the nervous system must be peculiarly susceptible to excitement. In the latter case epileptic fits may supervene. . . . That epilepsy does arise in some cases from this cause is proved by its appearing when the teeth are passing toward the surface and disappearing when passage is given to the teeth."

Dewees ("Physical and Medical Treatment of Children") makes this admission: "And though the teeth cut (lanced) upon may yet be remote from the surface, still the operation may be of the greatest possible advantage by dividing the membrane . . . and the disturbance of the system is quieted from the moment the gum is divided." That the phenomena have been attributed to other causes is not surprising, in view of the fact that comparatively slight attention has been given to dentition as a whole, and the permanent teeth in particular.

That this statement is not based on mere conjecture, attention is called to the anatomical relations of the second molar with the jaw. A very cursory examination will bring conviction as to the truth of the conclusions to which I have arrived. My attention was

originally called to this tooth as a prominent cause of reflexes at this age by several cases coming under care, which led to a more critical examination to discover if possible the cause and the remedy.

It is a well-understood fact by the more advanced dental observers that the nervous disturbances at this age, about nine years, have generally their origin in the teeth, and so certain are these as to the cause that the intelligent practitioner never fails to examine for obstructed dentition when called to diagnose a case. Dr. C. N. Peirce mentions a case, a child of a distinguished physician, and afflicted with chorea. The cause was diagnosed as a retained deciduous molar. The father was not able to comprehend that this retention could cause the nervous symptoms in the child. The extraction, however, demonstrated the diagnosis to be correct, as all reflex phenomena ceased.

In the case of the second molar, as well as others similarly situated, the relief must come by affording room for growth.

It is apparent that this is a difficult procedure with this tooth. It is deeply imbedded in the surrounding tissues, and it would seem impossible to afford any immediate relief. The first case which presented and claimed serious consideration was a member of my own family. At the ninth year this child was, without apparent cause, affected with violent convulsions that assumed an epileptic character. The seizures were prolonged, but days frequently intervened between them. The study given the case developed the hypothesis that the second molar was the pronounced factor in the cerebral disturbance. To verify this theory the child was carefully watched, and upon indications of an approaching nervous storm the lance was deeply inserted over the position of this molar. The result was entirely confirmatory of the diagnosis, and by care in watching symptoms and a repetition of the lancing whenever necessary the child passed the critical period without further reflex phenomena. Since that time other cases have been under my care, and the same simple method of treatment has been followed with equally good results. During the present spring a child of nine years was brought to me suffering intensely with pain in both ears. Examination of the teeth failed to show any cause for this in exposed pulps or other lesions. These having been excluded from the possibility of causing the suffering, it was decided that the origin of the pain was reflex and must be from pressure upon the

pulp of the partially developed second molars, or impingement of both upon the inferior dental nerve. The lance was at once applied to both, right and left, with immediate relief, and without any subsequent recurrence of pain now several months since the operation was performed.

There is, therefore, no question in my own mind that dentists are called to watch carefully the development of the second molar in childhood, and advise the only remedy,—free lancing.

The books are full of the sage advice that lancing should not be performed until the tooth manifests itself by forcing the gum above it into a rounded prominence. Lancing is indicated at all stages of development, whether upon the deciduous or permanent teeth, and should be resorted to as frequently as the symptoms indicate reflex phenomena. Dr. Dewees (quoted previously) recognized this, and he is the only medical writer with whom I am familiar who has comprehended this important point.

The third molar is so frequently the cause of reflexes that it would seem almost a useless expenditure of time to reiterate a well-known fact, and yet an examination of all the books on dental pathology and oral surgery reveals a great deficiency in the treatment of this subject. While this is true, I must refrain from its extended consideration here. Suffice it to say that these teeth, like the second molars, find their place of origin in the rami of the inferior maxilla, and have difficulty in assuming the direct vertical position. The two principal positions assumed by this tooth causing general nervous irritation are the oblique and the horizontal. The former is not a frequent cause of reflexes, and, while it may produce these by impingement upon the inferior dental nerve, it more often effects this by producing unobserved decay at the cervical border of the second molar, and eventually pressing upon the pulp. The difficulty of diagnosticating this must be evident, for as decay proceeds the tooth advances, filling completely the cavity and causing the lesion to be overlooked until neuralgic pains indicate some cause requiring the attention of the dental surgeon.

The most serious of all the malpositions of this tooth is the horizontal. The tooth in passing down from the ramus strikes the posterior root of the second molar, and there must stop. Deeply imbedded in the jaw, with the roots closely impinging on the inferior dental nerve, there is but one possibility, that of pressure upon that

nerve, and that continually and more forcibly as growth proceeds. The reflex lesions are, as you are well aware, of the most serious character. The important matter to consider here is the diagnosis.

It is quite evident that a tooth thus situated produces its disturbing effect through lack of room, and that this room cannot be secured as long as all the teeth on that side are in place. If, then, the entire series, from the second molar to the cuspid, are in position at the age of eighteen to twenty-four, with lancinating and intermittent pains extending throughout the fifth pair, and with no visible signs of a developing tooth, it is evident that the third molar is abnormally developed in the position named. An explorer passed down posterior to the second molar will settle this fact. If, however, the second be absent, or it is in place and the first molar absent, it remains reasonable that the third molar is not the cause of the neuralgia. The force of growth, as before stated, is quite sufficient to change the second molar from its normal position, and thus give room for the development of the third molar. If, however, both first and second molars are in place, the inference may be drawn that the third molar will not have sufficient force to move two such powerfully implanted teeth far enough to afford relief.

The importance of this malposition cannot be overestimated. Forget mentions a number of serious cases, and almost every practitioner of dentistry has seen cases of obscure reflex pain which may not have been fully comprehended. There is no lesion more easily treated than this, and yet it is one the general surgeon fails almost universally to diagnosticate correctly. A case which I reported many years ago may be worth repeating here as an illustration of this statement. A patient was sent to me for examination for a most obstinate case of neuralgia which had resisted medical and surgical care for twenty years. The physician who sent her expressed himself as hopeless of having her relieved. The woman was a physical and almost a mental wreck. Feeble and emaciated, vision very defective, hearing with difficulty, she presented a most dejected and hopeless appearance. The examination of the mouth gave no indication of a third molar. All the other teeth were in place. An explorer was passed down posterior to the second molar, and the third was found occupying a horizontal position abutting against the roots of the second molar. The patient was informed that the only remedy was the extraction of the second molar. No

opposition was made to this, and the tooth was at once removed. The effect was immediate, all pain ceasing, and in twenty-four hours the third molar had advanced and filled up the socket of the second molar. The patient in a month's time had recovered her hearing, the eyesight was greatly improved, and her physical and mental state had resumed normal conditions, pain having ceased entirely. She should have been saved this twenty years of torture.

At the time this case was under care the X rays were an unknown factor in diagnosis. It is unnecessary to state here that this at present would have decided such a malposition with unerring certainty. This paper is not, however, written for the favorably situated in large centers of population, where this aid can readily be obtained, but for those in isolated practice who will need to decide cases by the older and perhaps obsolete methods.

The reflexes from dentition, exposed pulps, calcification in pulps, and from other causes, have received due attention from various writers, but those interested will find very full reports of cases given by Brubaker ("American System of Dentistry"), Arkövy, "Diagnostik der Zahnkrankheiten," in an appendix prepared by Dr. Georg Creniceneau, and also in Wedl's "Pathology of the Teeth." It is therefore not deemed necessary to do more than allude to the fact that the recorded cases are so numerous that he who fails to recognize their importance is not fully grounded in the pathological possibilities contingent upon the abnormal changes in teeth. The subject is still obscured by imperfect observations, but sufficient is known to afford a basis for intelligent practice.

The reflex disturbances occasioned by the various recognized lesions have not been considered, as these are well understood and require no further elucidation. The main purpose of this paper has been to direct thought upon this subject, and more especially to two facts: first, that relief should not be delayed until the teeth manifest themselves at the gum-border, but in all cases of disturbed dentition, whether it be with deciduous or permanent teeth, the lance should be freely used, and that at the first symptoms of reflex disturbance; and, secondly, to call attention to the wholly neglected second molar as a cause of many of the serious reflexes about the ninth year.

DISCUSSION.

THE PRESIDENT: The time for the special order adopted this morning has arrived, which is the discussion of the papers of Drs. Black and C. N. Johnson.

DR. MCKELLOPS: Before opening this discussion I should like to say one word in regard to what has been accomplished by the X ray. We had a case of a young lady, about fourteen years old, whose mouth was perfect in every shape, form, and manner except that an upper cuspid was missing. We could not find any trace of it, or any place that looked as though there was a cuspid tooth there. So at the suggestion of my son, a dentist, we applied the X ray. First, they tried it on me, and then on this child, and we found the tooth lying right up close under the nose. There was no external indication of it, but with the X ray its location was perfectly determined. That is all I have to say on that.

THE PRESIDENT: Gentlemen of the Association, it gives me great pleasure to introduce Dr. Bryan, of Basle, Switzerland, whom I will call upon to open the discussion on the papers of Drs. Black and C. N. Johnson.

DR. BRYAN: Your President could not have selected a person more incapable to open the discussion on these important papers, and I presume he has simply done it out of courtesy, to introduce me to the meeting. My time has been so fully taken up during the last few years in the matter of dental education and trying to secure reciprocity for American degrees in Europe that I have had no time to study these subjects, and I find myself very far behind the times. So when Dr. Black comes with a paper like that which he presented this morning, expressing such ideas as he presented in that paper, so revolutionizing the teachings of the days when I attended a college in this country, I find myself entirely incapable of opening the discussion. I would much prefer to ask questions, and there are many men here who are better able to discuss these papers than I am. I shall have to be a good deal older and taller before I can get up here and say that the gentlemen who read these papers were radically wrong. My principal request would be to have further information as to the manipulation of the cements, and what is the prospect of our getting a cement in the near future which will fill our wants.

Dr. McKellops, if I may be allowed to mention him,—and his

long experience will give his opinion great weight,—claims that he will preserve temporary teeth and other frail teeth better with cement or gutta-percha than any other filling; but the results of the researches of these gentlemen who have presented the papers this morning show us an entirely new fact which had never occurred to me, and I suppose had never occurred to many others who are in the same position,—that cement shrinks. That is so very new to me that it will take me days to get imbued with the idea and fully appreciate the fact that cement will shrink, and still is the best filling-material to preserve teeth, in certain conditions of the mouth.

Dr. S. B. Palmer: I consider this a very important opportunity to explain some things by which I may disabuse the minds of people in regard to the supposed difference between my position and that of the gentlemen who have read their papers, or of Dr. Black, Dr. Miller, Dr. Williams, and others. The general impression is that because I entertain the idea that the finale of the etiology of dental caries has not been settled, I am at least open to criticism. I do not wish to deny that, but I wish to say that the two theories, the two ideas, are upon two different planes, and it is impossible for me to put myself in the way to be approved by others until they can receive the same impressions and ideas that I entertain. And those ideas are so radical that no one seems to me to have yet come up to the true plane. This may appear to be an egotistical statement, but it is the egotism of strong conviction. The manner in which I obtained my idea, many years ago, is such as to cause me to maintain it stoutly until it is shown to be untrue.

There are some writers who ask the older dentists, including myself, to submit to the new conditions and gracefully receive the honor due them for what was done in error, though they did not know it was error. They even say that it was not error at the time, but since new ideas have come out that we should be content with the new and not continue to bring our old ideas forward. Now, gentlemen, if I am sincere, of course you will understand that I must defend my own belief against the world. I can only add here that I do not antagonize or criticise at all the papers that have been read, upon their plane, but there is a failure to comprehend what I believe to be the evolution of natural laws from the physical plane to the vital plane. We may state it in this way:

First, we observe that minerals in evolution become vegetables; then through the vegetable, taken as food, the animal creation comes on and there is vital energy, another evolution into a new state of things. Now, I wish to say that in the first step, in the transformation from the mineral to the vegetable, there is an appearance of life, order, and beauty. There is the instinct by which each plant produces its own kind. Then that vegetable becomes animal food, to sustain animal life, and there is another development which brings it up to the condition in which *we* are. I will not pursue it into metaphysics, but we see that it does go, through the natural law, from minerals to mind without one break. Let that stop there, because I will not try to prove it.

Now, when you come to the animal kingdom, you see this vitality produced by partaking of organized food. It gives vitality, it gives instincts which enable the lower animals to produce their kind, to defend themselves, to seek for food, and so forth, and by the process of unfolding to come into the higher life of mind and will. This instinct proceeds from what? From the vital current that is taken into the system in food, which produces, in the individual, body and life and energy. That is the radical point, and until we conceive that the mind and constitution of a person are associated with the life organ in the body that directs the thing which will produce and maintain healthy teeth, until we come to an understanding of that, there will continue to be a lack of entire agreement between these gentlemen and myself. The vital principle which produces this condition is something which we cannot weigh or measure, and consequently I am unable to prove my position. I take no exception to any criticism, but there are a few who begin to understand and believe the position I have taken, and I merely stand before you to-day to place it on record. I may not live to see it accepted, but the time will come when it will be understood that this is the broader way of studying the subject. There is hardly an occurrence in experience or history which does not illustrate and embody this great principle.

One word in regard to how this discovery was made. I feel that this is due to me as well as to you. In 1847 I commenced the wearing of a silver plate. During my studies in dentistry until 1849 I wore that plate. Previous to that time, or as long ago as that, electricity was a hobby with me. I studied it merely for

amusement, never in school, because very little attention was paid to it in physics. I do not know when the discovery would have been made, had not the wearing of that plate produced its effect. I was brought to see that food taken into the mouth produces a current which passes into the system as organized intelligence, a galvanic current stored in the muscles and brain, distributing to the different organs aid to perform their work, each according to the pattern set before it. Look at the tooth, for instance. From the first calcification there is developed not only one tooth, but an opposite one to correspond in size, form, color, and function. So each organ performs its work. That is constitutional; that is mental; that is divine. How did I learn this lesson? Not by reference to authority, for all authorities were against it. But I wore that silver plate in my mouth. Gold or aluminum would never have taught the lesson; but the silver plate in the mouth in contact with food during mastication converts that which we know nothing about except by taste and choice into organized electricity; that is to say, that plate with certain kinds of food produced a metallic taste, a metallic current, which was very distasteful and disagreeable. Without that there was nothing but the taste of the food. That plate would detect, as any galvanometer could be made to do, anything that was foreign. For instance, in canned fruits the metal in the syrup, or the presence of any metal in the food, was at once easily detected upon the silver plate. While wearing that plate even the fumes from a sulfur spring passing in the air would affect the plate, and I could perceive it more plainly than I could by the organs of smell.

This went on for some time. I undertook to carry on physical experiments with the galvanometer to prove my position. I could produce the currents outside of the mouth with saliva and the articles of food, just as I believed them to be in the mouth. But what did that prove? Nothing. Life was gone, taste was gone, so that the conditions between the mouth and the laboratory were vastly changed. This led me to conclude that taste is vital electricity, and that vital force is attended with mind, and that mind is attended with decay of teeth, if you please, constitutionally.

It sometimes occurs through disease or old age, or through devitalization of the pulp, that there is no circulation in the dentin.

Then the tooth becomes inert matter, and the findings of these gentlemen are true when they say that teeth may be filled at any age with gold, and so forth, if they fulfill the law by which gold serves its purpose. Years cannot determine it. It is the condition of the system, the constitution, the taking of the metal into the dentin which is in contact with the pulp, that does the work.

Dr. Barrett yesterday said that the currents exist, but that in the mouth they are too slight to do any harm. Just here the doctor fails to get my idea. The point is this: by the mastication of food there is a current generated beyond anything that you take into the mouth, and where there is a metal it will always attract and convert that current into physical electricity. That is what the galvanometer shows, but in passing out of the mouth the vitality disappears, it escapes as the vitality escapes from a jet of blood when it passes from an artery. The life has gone from it. So I depended upon this to distinguish the presence of a foreign substance by the difference in the taste.

It will not do to carry this thing through here in detail, but I want to state to you the reason why we cannot agree upon this thing. It is because the planes of observation are different. My experience is not perceived by others. No one is to blame for not perceiving it, but when you come to perceive it you will know it even if you cannot tell it to others, and what I am telling you will come to light in the future.

I thank you all for the kind treatment I have received during this long controversy; your courtesy has never failed. When the time comes my thought will be recognized. Until then I do not wish to annoy any one; but I am glad for this opportunity to have my belief recorded, that food produces a vital current of electricity which is introduced into the system, which carries on the work and reaches into mentality, into mind. I will forbear going any further, and simply thank you for your attention.

The President: I take great pleasure in calling upon Dr. Corydon Palmer.

Dr. Corydon Palmer: A great many of you know that I am a very poor talker, but I will do the best I can. What I was most especially interested in was Dr. Johnson's paper in reference to the treatment of the deciduous teeth. He has given the finest and best directions there, and I can scarcely compliment his paper

and his thoughts too highly. In his paper the subject of the use of tin foil and gold mixed was mentioned. That may be a very good thing. What I have done through my life has been done because I wanted to do some good in our profession, and to do it in the right way. The older ones here were familiar with the old methods of hand-pressure, and if the younger ones have not studied those methods it would be well for them to go to work and learn them. They should get instruments adapted to that work, and they will be surprised to find what they can do. They should be able to make use of that method if they want to.

In 1839 I was quite young, and I took an admiration for dentistry. At that time there was no tuition to be had. A young man could not get into a dental office to see anything, and I was left to make my own way and to conduct my own experiments. In my first attempts, before I had any gold foil, I used the tin foil to experiment with, and then pretty soon I got some gold foil and I went on and became able to make both tin and gold fillings. It was understood at that time that those were the two materials that were the best to preserve the teeth. And what was true in 1839 is true to-day. A pure, nice tin foil will preserve a tooth better than any other known thing except gold, and in many cases better than gold.

Now, I do not agree with the idea expressed here to-day, that it makes no difference what kind of filling is used in teeth which are soft and poor in structure, which have become so from heredity, and that the way to save those teeth is by constitutional treatment. If you have teeth of good structure, and if the conditions are favorable, gold is the best thing to use; but when you have soft teeth and softened dentin and poor enamel, the softer materials are better to preserve the teeth than the gold, and we have a pretty good range of them. The amalgams have been pretty well perfected, and in many instances they are best. Sometimes the cements, and sometimes gutta-percha. But let that be as it may, the thing in which I am most interested is the management of children's teeth. I have been in the colleges some. I have seen the students who were privileged to go to the extracting-room when the patients were brought in. Going up the stairs one day, I met a woman with a dear little child, an infant, in her arms, and it grieved me to see the little child there, so that I stopped her and talked with

her, and asked her what she was going to do, and when she told me she was going to have that little infant's teeth extracted, I begged her not to do it. But she said, "He cannot eat anything, he suffers so much, he must." Well, the poor woman did not know any better, and there she was, about to put her baby into the hands of students to experiment upon. At another time I met a little child on the street, in my own place, with her little mouth bleeding, and she looked up to me and said, "I have been having my teeth extracted." Well, I looked into her mouth, and I saw she had had three or four of her inferior deciduous teeth wrenched out, when no change whatever had begun to take place. In my own practice, and I began in 1839, all the way through I have had to be a sort of teacher, and I had a very large extent of country around me. I had to explain and try to teach my patients, and I made the thing go along for about sixteen years, and then they began to break in upon me. Now, you have little children intrusted to your care, and it is your place to advise the parents about them. A little child comes who is just beginning to change its teeth. It has the first permanent molars pretty well advanced, and the two superior centrals, and the two inferior centrals. You find that the first permanent molars, as soon as they have got up far enough to be fairly in sight, are a little decayed in the crowns, right in the sulci. So at about the age of six years they will have four molars, two above and two below, which need to be filled, and pretty soon the second molars will come and they will need to be filled. Now, if you wish to do the best thing, you may be required to fill one tooth on each side and perhaps four of them, and if you will prepare those cavities, and have some nice tin foil and some good instruments for introducing it, you can whip the tin foil into each one of those teeth and make a filling there that will last that child until it is twelve or fourteen years old, and sometimes they beat me so that they keep them in until they are grown up. Now, I would not advise any one to undertake to mix gold with the tin foil to use in that way. If you wish to do it in after-operations, that is well enough. I cannot say very much for it. I have used it to some extent, but for the little ones you can do what I have suggested and you can do it quickly, and when it is done it is done and there is nothing more to do. You can do it rapidly if you are used to it. If you undertake to put cements or amalgam into those teeth, you cannot do

very much after, because if you let it go before it has time to harden it is a failure; but if you put the tin foil in nicely you make a nice filling that will preserve the teeth, and I have been able to do that with very young children. There is no difficulty about it if you are kind and manage them properly, and I would recommend the tin in cases where you wish to fill the teeth with something that will be more permanent than the cements.

Dr. Johnson, in his paper, advocated the importance of cutting away the distal part of the deciduous molar, in order to give the opportunity to fill the permanent molar properly, and that is fine practice. It should be done to favor the anterior surfaces of the permanent first molars, but I recommend the use of tin because with it you can fill the cavities very quickly, and if one knows how to manipulate with hand-pressure and to hold the little mouth securely and firmly, and not make a slip, it is very easy to get a splendid result. You make up the tin by cutting it into strips and folding it over until it is the right width to make it into cylinders.

Dr. W. H. Jackson, of Ann Arbor, Michigan: Dr. Black said that the action was local, not constitutional. In a sense decay arises only locally, and yet the environment is often caused by constitutional troubles, and I think more frequently from constitutional than from local causes. The environment may arise from some local deposit of material between the teeth. It may arise from catarrhal conditions. The constitutional condition may arise from malarial or other diseases, and produce an environment of the tooth which will cause decay. It is the environment which makes the local actions. When you have a bad environment your tooth will decay. The teeth, to be sure, are hard enough, where the environment is favorable, to last a person's lifetime without decaying, however poor they may be; I have seen, and many of you have seen, teeth so soft and chalky that you could cut them all away, and still they would last on through the person's life, simply turning brown. Germs will not develop in healthy secretions of the mouth.

Dr. Laurence Leonard: I wish to say a word on Dr. Black's paper, especially on the part relating to immunity. Our mission is to save teeth, save them by anticipation as well as by mechanical restoration. The sphere of dentistry is to save teeth, whether for the millionaire in the East or for the poor who are the subjects of

charity as cared for by Dr. Gramm and his worthy colleagues in Chicago, or whether it be for our soldiers and sailors, and may Providence help Drs. Donnally, Finley, myself, and others to get suitable legislation for the two latter.

I wish to say a word upon a remark which Dr. Black made concerning the importance of healthy tissue and vigorous use.

We can have healthy tissue and vigorous use of our teeth by paying heroic attention to something that we, as dentists, frequently only advise supinely, and that is, insisting upon the extraction of decayed and useless third molars, decayed and useless roots, and the proper use of the brush. I think if these three things were attended to strictly we would have a more healthy environment, a more frequent use of the brush, and a more vigorous use of the teeth, and a consequent predisposition to immunity.

Dr. Hofheinz: The difference which exists to-day between Dr. Black and some of his scientific brethren and the majority of ordinary men is very slight. When I say ordinary men I do not mean ignorant men, because I do know that within very recent times some of the very best scientific thinkers have not been in accord with Dr. Black as to the physical condition of the teeth themselves. They have looked upon the very substance of the tooth as the main cause of the rapidity of decay; but, from recent presentations of Dr. Black's view, I think that the clinical observers must and will be compelled more and more to give up their clinical standpoint, and come to the adherence of Dr. Black's scientific researches.

In connection with the question of heredity that Dr. Black has so forcibly brought out, I wish to ask him one question. When Dr. Brophy presented his paper yesterday, on the treatment of cleft palate, he gave us, beside his very interesting method, a most wonderful presentation of atavism, where the inherited condition did not come from father or mother to child, but to grandchild. Now, I am not old enough to have been able to observe three generations in my practice, and I would like to ask Dr. Black whether he has observed that same peculiar condition of atavism in tooth-decay which Dr. Brophy has observed in cleft palate.

I am extremely glad that Dr. Black has emphasized one thing in his paper, which is, that his researches are based upon those of Professor Miller, of Berlin. Since Drs. Black, Williams, and others

have made their original researches there has been a popular view that those researches are made at the expense of the views of Miller; but that is in no wise the case. Miller has, beyond any and all doubt, established the fact as to what the cause of decay is, and that will forever remain the foundation upon which all other researches have to be built. It is only owing to Professor's Miller's ill health that he has not enriched and elaborated upon his own work which made him immortal.

THE PRESIDENT: We will give Dr. Black a chance to answer that question, and then defer the further discussion until the first order this evening, in order to give Dr. Custer an opportunity to deliver an address on electricity, before we go to the power house.

DR. BLACK: Without searching my records I do not know that I can give as definite an answer to that question as I should like. I will answer only from memory, as I have not especially observed that feature, that is, the skipping from the grandparent to the grandchild of a hereditary predisposition to caries. I have noticed in families certain children missed, but in those cases it was almost uniformly found that one parent was practically immune. So I cannot answer the question in a manner satisfactory to myself.

DR. CROUSE: I think the debatable feature of the papers that have been read, in regard to the theory of prevention of decay, has not been brought out prominently, and that is the extension of the cavity beyond the decay, so that the margin between the cavity and filling will be kept clean; by which I mean extending the cavity beyond the danger point. I am raising this question because I believe that this line of practice will become more general the more it is studied, and that the carrying of it out will lessen the number of failures from after-decay, which necessitates doing the work over or repairing it.

DR. CRAWFORD: I have been hearing papers in dental societies for a long time, and it seems to me that the two which we have heard to-day are of as much practical importance as any two papers I ever heard read. There are but very few things in Dr. Johnson's paper which I would change. I should be glad if he would eliminate the use of amalgam in the treatment of the teeth of youth, or the treatment of the teeth of anybody; and in opposition to the moral force therein expressed I am going to say something that I

know my profession will not believe, but nevertheless it is true. The introduction and use of amalgam in connection with the treatment of diseases of the teeth has done more harm than it has done good. [Applause and a hiss.] That hiss will not down me when I know I am right. That might be heard on other occasions more appropriately, from the fact that the interests or the heart so sensitive and so much at disadvantage are at stake; but let me say that human life and human happiness are involved.

Other suggestions might be made, but, excepting that small blur upon the magnificent picture in that paper, it is a good thing to look upon. In further indorsement of that paper, let me say that if it was put in book form or in leaflets, and sent to every dentist upon the American continent, and memorized from one end of it to the other, like the Lord's Prayer by good Christian people, it would do more to push dentistry along in this country than almost any one thing. I thank Dr. Johnson for his paper which he read to-day, and I wish he was here to-night.

As to Dr. Black's paper, I am sure I am now going to submit myself to criticism; but while I am not as good a Christian as I ought to be, yet, relying on the statement that you cannot hurt a Christian, I am going to say what I have to say, anyhow. Dr. Black can tell part of the truth, in a scientific way, as well as any man I ever heard in my life. For instance, when he was enumerating the various factors and conditions that lead to dental caries or carious action in the dentin of the human teeth, he mentioned many of the physical environments and conditions, but he did not say a word about the psychological influence. Not long since, talking to a gentleman very prominent in the surgical world upon affections of the face, he made the philosophic observation that it was remarkable to what extent the fifth pair of nerves become involved as the result of mental worry. Now, let me suggest to Dr. Black and other scientific workers that they hear me for the worth and value of this philosophic thought. The dental profession of America have dropped into the trap of thinking that the dentin of the human teeth—the structures between the enamel and the pulp—are, in an absolutely normal condition, sensitive to cutting. Most of the workers upon the etiology of dental caries have failed to recognize the fact that the hypersensitiveness of the dentin is as much pathological as the carious cavity itself.

One other practical observation, and I will take my seat. In the theological world there are three ways by which people learn: by prophecy, by inspiration, and philosophically. In the practical, every-day sense there are three ways to learn: one is from the philosophic standpoint, another is from the intensely scientific standpoint, and the third is by the slow, tedious, faithful process of experience. It was announced upon this floor to-day that it has been within only a few years that we learn things scientifically. Allow me to say that from the time the first man lived in the world and became familiar with a truthful proposition he had as much science in him as any man had, so far as that one thing was concerned. You tell me that the great microscopic, telescopic, and philosophic mind of Hunter did not learn something, and that many of the fathers of medicine—Hippocrates and Galen—did not learn anything? We must not attribute all the development of scientific truth to modern research or modern men. Scientific truth has ever been only common sense made exact, and it does not matter by what process you arrive at the absolute truth. It is nevertheless just as mighty and will prevail.

I hope to see the time when the absolute etiological signification of dental caries will be known to the civilized world as surely as the simplest fundamental principle in mathematics is exhibited upon the blackboard, when we write, "twice two make four." A long time ago I prophesied that if one of the greatest questions of medical and surgical science was ever definitely and absolutely settled to the satisfaction of all the people concerned it would start in the odontological world, and I said it upon the basis and upon the fact that the tissues most peculiarly and favorably situated for the locating of definite diseased action are those tissues which are the particular province of odontological treatment and examination.

Dr. B. Holly Smith: I am not surprised that there are a large number of people standing up. I was almost disposed to stand up and start to run myself. When I remember that the gentleman who provoked this eloquence and oratory is behind me, I am still more timid.

In reference to the paper which Dr. Johnson read and which I enjoyed so much, I want to say that the conservative spirit of this paper, as well as of nearly all the work which I have seen described by this able gentleman, has appealed to me. I really think the day

has passed when the dental chair should be the place where human resistance and endurance shall be tried, that the day of the reputation of old-fashioned dentistry ought to go out. Those persons who come to us cringing, afraid to run the gauntlet of our attention, are gradually disappearing. The patients that I receive from some of my *confrères* no longer approach me with dread, and I can say frankly that the youngsters who have come up under my attention come to see me willingly and gladly; so that I say it ought to be a subject of congratulation to the members of the dental profession that this conservative treatment is placing a new impression in the average human mind. It is extending our usefulness. What are we going to do with the large number of young men who are coming into the dental profession? The increase in the number of practitioners of dentistry is largely out of proportion to the increase of the population. If our operations are conducted humanely and conservatively, as advocated by Dr. Johnson's paper, you will find that we will probably have fifty per cent. more to do. You all know and I know that a large number of people stay away from the dental office because they have wrong impressions of the way dentistry is practiced to-day. I thoroughly commend and approve of the paper, and wish to compliment the gentleman upon it.

Dr. Newkirk: At one point in Dr. Johnson's paper, where he spoke of relative value of cements and amalgams, I was hoping he would speak of a combination of the two in some cases. One may fill the cavity partly full of cement, then introduce the amalgam and force it in thoroughly, crowding a little of the cement around the edges, and so lining the cavity. By that method you get a combination of the wearing quality of the amalgam and the close-adhering and preventive quality of the cement.

He also said something about the difficulty of keeping the teeth dry, the use of napkins, and so on. Now, it is often possible, if you are careful about the adjustment of a little clamp, to use the rubber to keep the cavities dry, even in the mouths of quite young children. Sometimes I make the little patient my assistant, giving him a glass so he can see what is going on. I show him what I wish him to do, and have him put his finger up and hold the pad, a roll of cotton, or a piece of thick spunk, if on the left side, between the tooth and the cheek; if on the right side, between the tongue

and the tooth. I hold a pad on one side and he holds one on the other, instead of my assistant.

I wish to say one word about Dr. Black's paper. He has been held up here to-night as simply a scientist,—a man who treats his subject largely from a theoretical standpoint. But Dr. Black has been for forty years and more a practical man, a man who has been engaged not only in scientific research, but in active personal practice. He has had a large and full practice in one neighborhood, and of that practice he has kept a complete record, so that he has his facts at hand as possibly no other man in the United States has to-day. He has a mass of material to draw accurate conclusions from, so that a man who attempts to controvert his statements needs to be very well fortified. I should hesitate to make a positive denial of any of Dr. Black's propositions, for as a general rule he has facts behind him with which to substantiate them. His paper represents long experience, close observation, wonderful industry; such industry as some of us have very little conception of from personal experience.

Dr. E. T. Darby: I do not rise to criticise adversely Dr. Johnson's paper, but, on the contrary, to commend it in the highest terms. There are a few points, however, in connection with his paper that I would like to put an interrogation point after. One of those is the question, "Should arsenic ever be used for devitalizing pulps in the deciduous teeth?" I observe that the doctor spoke in the most positive manner against the application of arsenic for that purpose. Had I been asked ten or twenty years ago if it were permissible to use arsenic in the temporary teeth, I should have said no as positively as Dr. Johnson did this morning. For many years I never applied arsenic to devitalize the pulps of deciduous teeth. My practice was to devitalize them with creasote and with cantharides in powder form. I found that this could be done quite readily. But why not apply arsenic in minute quantities for the devitalization of pulps in the deciduous teeth? I know of no reason why it should not be used. I have yet to see the first bad results attending its use in my own practice. Of course, it should be used in minute quantities and with great care and judgment, and the application thoroughly sealed in the cavity.

There was one other point in Dr. Johnson's paper to which perhaps I should take exception, and that was the free use of gold

which he suggested in connection with the permanent teeth of young subjects. If I understood him correctly, he stated that just so soon as the patient was old enough to stand the wear and tear incident to gold filling it was wiser, it was the better practice, to fill the teeth with gold, or, as he said, permanently. I do not think he quite took into consideration, or, if so, he did not state it, the influence which thermal changes have in connection with so good a conducting material as gold. Now, it is presumed that every one wishes to make his operations as permanent as possible, and to achieve that result as early in the life of the individual as possible; but my own observation and experience has convinced me that thousands of pulps have been devitalized by thermal changes caused by the too early insertion of gold in the teeth of children. It is my opinion that it is vastly better to keep such teeth along from year to year with cement or gutta-percha fillings until the child shall have attained the age of fifteen years,—I do not dare say, in the presence of Dr. Black, "until the tooth has assumed a greater degree of hardness," but I do say it is better to preserve those teeth with plastic materials, non-conducting or semi-non-conducting materials, up to fifteen or eighteen years of age. This is not a wild statement, and I think my own experience and observation and your experience and observation will bear me out in that assertion.

These last remarks almost lead me into a discussion of Dr. Black's paper, but I am afraid to do so because as I grow older I grow more cautious, and less inclined to set up theory against scientific investigation. Years ago I would have said that great changes take place in tooth-structure; that every practitioner of operative dentistry sees the teeth change from bad to good, sees teeth that are apparently exceedingly soft and friable at twelve or fifteen years of age very good teeth at thirty-five or forty or fifty years of age. But I say I am afraid to make that statement, because I have the profoundest respect for Drs. Black, Miller, and Williams and their scientific knowledge, and they tell us that no such changes take place in tooth-structure.

Dr. Bogue: Dr. Johnson's paper was so admirable in all of its items, so far as it went, that I rise only to express regret that he did not emphasize a little more the use of tin and gold and of tin alone in the preservation of the deciduous teeth, as well as of those

friable teeth about which Dr. Darby and myself do not dare to speak. I do not know how generally tin and gold are now used, but it may be known, and perhaps should be known, that there is a molecular change taking place when tin and gold are used together, that causes the compound to closely resemble amalgam in touch; but at the same time, in addition to the galvanic action, produces a filling which is larger than the original filling inserted. I wish once more, after the expiration of twenty years or more, to express the hope that my professional brethren will not forget those materials in their operations on the teeth of children.

Dr. McKellops: I have a few words to say on this question of the treatment of children's teeth. I like the paper very much that I heard read this morning, but of course I have some objections to it. We talk about filling teeth with gold, and all this sort of thing. I admit that, but ever since these cements have come in and my trial of oxyphosphate I have urged the using of those cements and the keeping of children's teeth until they arrive at such an age that I can operate as I want to upon them. I can prevent any decay in those teeth if they are properly cared for in that way. Then, when the teeth are all there and I go to fill those teeth, I put a foundation of cement at the bottom. The rubber-dam is down; there is no dampness or anything else, and you have saved two-thirds of the work on that mouth. What is the result? You may take that out years afterward and you find no decay under that cement filling. The tooth is preserved. If you take the precaution to do that you will not find any decay under that cement filling, no matter what you put on it. If you put amalgam or anything else on the top of it, it is going to stay there and preserve that portion of the tooth. Now, if gentlemen will pay a little attention to these things and look what they are doing, they will find what splendid results they will get, and what amount of suffering they will save the little ones, and the older ones, too, by using this cement in the way I say it should be used. Of course we should get a cement that acts well, although I find no trouble about that. I can take the teeth of old people and keep them in the mouth for years and years where their teeth are tender and they cannot stand gold fillings. I have a case now of a lady who has not a plug of any kind in her mouth except cement fillings. She is a lady in every respect, and goes everywhere, and she has no trouble at all about the work in her mouth.

Of course these have to be replaced, and they will wear out. They will wear down, but your patients have confidence in you and they come to see you; and it is very easy to replace these fillings. If you will take children's teeth and fill them up with this cement and keep them year after year until they arrive at a later age, then you can go to work. And what have you? Then you have perfect work; work that will carry them through life; work that you will not be ashamed for any man to look at, but work that you will be proud of.

Now, I want the profession to think this thing over carefully, and try to see what you can accomplish in this direction. Even if you are putting in amalgam fillings, if you will put this in look what you save. Nothing leaks more quickly than an amalgam filling, and you have this cement under that protects them, that keeps the mercury out, and prevents all that soreness by having this cement. Why not try it? I have tried it years upon years, and I have made a perfect success of it in my work.

Dr. Harlan: The subject of filling teeth is always very fascinating to any dental audience. While I have been a very close attendant on the sessions since they began, I am very much astonished at the position taken this evening and at the position taken by one of the essayists this morning who read a paper on the penetrability of cements. This morning it was shown that when a number of pencil-like pieces of oxyphosphate of zinc were placed in a bottle having a certain percentage of anilin or eosin, or something of that sort, in solution, that they were all permeated by this coloring-material; and the statement was made that there were no cements sold to dentists except one that did not expand or contract; that they failed to protect the tooth-cavity, and hence were not reliable filling-materials. Yet this evening my venerable friend McKellops, of St. Louis, and Dr. Darby, a professor of operative dentistry, and others perhaps state that the only way in which you can preserve teeth up to a certain age is to fill them with cement or gutta-percha. Now, it seems that practical experience and laboratory experiments do not go hand in hand according to our experiences to-day. What are we to do? Are we to go on filling teeth with these cements that are sold to us, or are we to abandon them? If these experiments are correct, then it is not safe apparently to introduce such materials into teeth, because they will leak. Now, I know

perfectly well that anilin dyes do not come in contact with teeth. I also know that glass tubes and bottles containing solutions of this kind, if not kept at the same temperature as the human body, will make the experiments more or less negative. While it may be true that some manipulators are so skillful that they can always mix these materials so that they will properly fill a cavity and not shrink or expand, I think it is true, on the other hand, that many operators do not so mix them, and hence there are many failures. I only call your attention to this seeming discrepancy between the one paper and the other paper, and the speeches that have been made this evening.

Now, with reference to another subject that was spoken of by Professor Darby,—namely, the use of arsenic for the destruction of the pulps of deciduous teeth,—I do not think that even experience in this particular should be the guide of the dental profession. The dangers from the use of arsenic for the destruction of the pulps of deciduous teeth are too great, in consequence of the insecurity of many such applications in the teeth of such small subjects, and in the presence of the fact that all of the known cements leak. When arsenic is brought into contact with the dentin of the tooth, no matter whether it has been wholly deprived of the enamel or not, the pulp of that tooth certainly and positively dies, even if it is kept in for only a short hour. The late J. D. White, who was one of the first editors of the *Dental Cosmos,* was one of the most strenuous advocates of the use of arsenic for the destruction of the sensibility of dentin, and he had a good many followers; and in after-years it was found that many of those teeth became pulpless and diseases were established, showing that the presence of arsenic in a tooth was fatal to the vitality of the pulp. I account for the non-appearance of many bicuspid teeth by the fact that arsenic has been placed in the deciduous molars and has escaped, and the crypt containing the germ of the permanent tooth to take the place of it has been destroyed by continuity of absorption of the arsenic. I do not say that that occurs in all cases, but in many cases I have accounted for it in that way. It is well known that arsenic will produce necrosis by its presence for any considerable time, or even for a short time. So I think it is not a safe thing to advise the majority of practitioners, young or old, to use such a corrosive penetrating agent as arsenic for the destruction of so simple an organ as the pulp of a

deciduous tooth, even though Professor Darby in his speech intimates that he uses it cautiously. Other means that will not by any possibility destroy the alveolar process or the crypts within which the germs of the teeth are contained may be used with absolute safety, such as chromic acid, ethylate of sodium, and nitrate of zinc, silver, etc.

Dr. Hofheinz: There is one thing which I have missed in Dr. Johnson's paper, and that is the use of nitrate of silver. I am extremely sorry that the doctor is not here to tell us whether that omission was a condemnation of the use of nitrate of silver or whether it was forgotten. It seems hardly probable that it should have been forgotten in such an able paper as he has written.

A member: He uses nitrate of silver.

Dr. Hofheinz: I am glad to hear it, because there is certainly no remedy which has been mentioned, he not having touched upon other means, for producing the local immunity that we are looking for in children's teeth.

Another thing I wish to dwell on is the filling of root-canals in children's teeth. It is not necessary for me to say to this audience that it is as important to fill the root-canals of children's teeth as it is those of permanent teeth. But how many times are we able to do this? How many times are we restricted by the physical debility and other circumstances from doing what we know we ought to do? I believe that where we are not able to thoroughly fill the root-canals in children's teeth we ought, after thoroughly sterilizing them, to adopt the old method of leaving those root-canals open. It is not to be advocated under favorable conditions, but where necessary it is better to resort to it by drilling into the pulp-chamber beneath the gum, so as to prevent the accumulation of gases, than to do an imperfect piece of canal filling.

Dr. Sitherwood: I wish to say a very few words on Dr. Johnson's paper, on the point that has just been mentioned with reference to filling the root-canal. There is nothing in the practice of filling deciduous teeth that has troubled me more than that one thing. For the last year I have made a practice of filling the root-canals of a large number of the deciduous teeth, and I do it practically as Dr. Johnson mentions in his paper; but instead of using the rubber-dam, as nearly every dentist at the present time has the fountain spittoon and the saliva ejector, I find there is nothing that

pleases children more than to let them hold the saliva ejector. You can dry out the cavity and often fill the root-canals very readily.

I am heartily in accord with Dr. Johnson in what he says about using cement, but I find that the manipulation, and especially the temperature at which the cement is mixed, has a great deal to do with the permanency of the filling; and if it does not remain and does not do good service I am sure that I did not manipulate the cement in the proper manner.

Now, the other point to which I wish to call your attention is this: I am grateful to Dr. Black for his paper, and I wish to call attention to the point at which these two papers unite. That is the immunity of the deciduous teeth. Again and again mothers have brought their children to me and asked me what they should do with those front teeth, especially the superior incisors of the deciduous teeth. I have examined them under the magnifying glass and found that they have decayed to a certain extent, but that the decay has ceased. In other words, they are immune; they will decay no further. I so state to the parents, and they are much gratified to find that these little approximal cavities at the corners of the teeth that have decayed away and become brown will decay no further. Why this is so I know not. I merely state the fact.

I understood Dr. Hofheinz to mention nitrate of silver. Citrate of silver is very much better. There is no remedy of which I know that is so useful in my hands in the arrest of decay in small cavities as the citrate of silver, that white powder which you get that is readily applied to small cavities, and which of course produces the same effect as the nitrate of silver. It blackens the surface, but it does prevent decay; and there is nothing better than the citrate of silver for those irritated surfaces on the enamel of the permanent teeth, as well as the deciduous teeth.

Dr. Hofheinz: May I ask whether the citrate of silver produces a similar albuminous compound to that produced by the nitrate of silver?

Dr. Sitherwood: It produces the same effect. It is a milder caustic.

Dr. Vann: First of all, I should like to express my high appreciation of the able manner in which these gentlemen presented their papers to us this morning. With respect to Dr. Black's paper, I should like to say that a number of years ago I noticed in one of

the journals that Dr. Black recommended extension for prevention, and I studied that phrase over and over again. I decided that it was a good thing, and then I began to study the preparation of the cavities that I had been preparing and the fillings that I had inserted into those cavities. I watched them closely, and I adopted this manner of preparing my cavities on the approximal surfaces and filling them with gold after that manner. I have watched them since for some six or eight or ten years, and my observation has been that that is the only way by which we can preserve these teeth that are broken down on the approximal surfaces. I feel greatly indebted to Dr. Black for that little expression that was incorporated in that letter to this dental journal. Now, in speaking of the paper that was read by Dr. Johnson, I want to say just a word or two about one of the filling-materials that he recommended, which is gutta-percha. A number of years ago it was our happy privilege to have with us in the city of Atlanta at the Southern Dental Association our distinguished friend, Dr. W. G. A. Bonwill, and on that occasion he demonstrated the manner in which he used red gutta-percha in the filling of approximal cavities in children's teeth. The question was asked, "Why do we fill children's teeth, or the deciduous teeth, at all?" And he readily gave an answer to that question. He said, "Not only do we want to preserve these teeth, but we want to preserve the space in the little jaw that we already have, and to induce development in this jaw for the accommodation of the permanent teeth that are to follow." After inquiring of the doctor what kind of gutta-percha he used, I purchased some and went right home and began the use of this filling-material for children's teeth. I have found it to be most satisfactory. I have watched it, and it is as the doctor says. It brings about that development that we most desire in the little jaw, that will amply provide space for the advancing permanent teeth. It is very easily inserted, if we have our cavities dry, by first drying out the cavity with a little alcohol, and then using a little balsam cut in chloroform; in this cavity we can insert it so that it is with difficulty that we remove it at all, and it can be inserted in a moment. It matters not how much frightened the little patient may be; it is done so quickly that he hardly knows it, and will often ask you if the cavity is really filled. I would most heartily recommend it.

Dr. Ames: I wish to attempt to correct an impression which

seems to have been made this morning, that there is a discrepancy between real clinical results with the cements and the results which are obtained by laboratory experiments.

So far as porosity of cements is concerned, I do not think there can be any question about the experiments made by Dr. Wedelstaedt comparing with what you have already seen in practice. You have seen cements which were porous and which became putrid. Dr. Wedelstaedt need not have made such large masses to have shown satisfactorily how porous that cement would be after setting. I do not know what material it was, but I do know that we have materials of all degrees of porosity, from such as was shown to those which are not at all porous, and which will stand all such tests perfectly. It seems unfortunate that the difference was not shown in masses of ordinary size.

I wish to correct the impression which seems to have been made in regard to shrinkage of cements. While shrinkage in a dry state —in steel tubes—was noted, there was no recognition of shrinkage of cements when packed into steel tubes or tooth-cavities and kept under moisture. It is only in a dry experiment, where there is no analogy to the practical conditions, that we find shrinkage.

In connection with the method spoken of by Dr. Johnson of pressing cements in with the thumb or finger, I want to suggest the practice of what Dr. Pearsall advocated in his paper, entitled "Tin Foil Matrices." Just put a layer of tin foil beneath your finger and press the cement well to place, and see what a beautiful surface it will give. The patient may bite into the tin to get occlusion.

Reference has been made to the use of nitrate of silver and citrate of silver. I wish that some of you would try chlorid of gold wherever you have been in the habit of using nitrate of silver. You will see how much more effectual it is in every way. Get chlorid of gold crystals, and either let them liquefy slightly or pick up a small bit of the crystal and apply it to the surface, just as you have been applying the nitrate of silver, and I venture the prediction that you will like it. The effect will be similar to that of nitrate of silver, and more pronounced.

Dr. Bogue: I wish to say a word on Dr. Black's paper before he begins his reply, lest I should have failed to understand him thoroughly. "They that are whole need not a physician, but they

that are sick." Mostly we see the sick. I think I have seen certain teeth that are immune to decay. I think I have seen suggestions certainly of teeth that are self-cleansing. When a distinguished gentleman the other day challenged me at the hotel to find one such case I showed him the picture of one, and I have quite a number in my cabinet, which cabinet contains a thousand or twelve hundred models.

Now, I wish to say that I have seen a gentleman of fifty-three (who told me upon his honor that a tooth-brush had never been in his mouth), who had a set of as nearly clean teeth as I ever saw in my life, and that means a good deal. I spent an hour and a half searching for a cavity, and found but one. That cavity was between the third molar and the second molar, where one of our profession had run a file to see what the matter was. Why were those teeth immune to decay? I do not think I know accurately. I did think so when I saw the patient, however. The teeth were well formed. The enamel covered the dentin. I could detect no place where the enamel-plates failed to coalesce. They were rounded. They were not flat. The dental arches were complete. The triturating of food could go on accurately and well between all the cusps, below and above, without driving the food into the spaces left either by filling or extraction, barring the one spot where the file had been used. Nowhere upon the necks of the teeth could I find deposits of food or any other thing. Those teeth were immune. If we look back to the races that have preceded us, and examine the skulls in museums, we shall find there a great many specimens of teeth that have been immune to decay. As I understand Dr. Black's labors, they have been in behalf of those who were not whole, but who needed assistance to continue the protecting of the covering of enamel which should prevent decay in the dentin. For one, I am very grateful to Dr. Black, even for the point which I understand him to make,—though I may be wrong, and if so I hope I may be corrected,—that no matter how frail a tooth may seem, no matter how soft it may seem to the instrument, that tooth, if covered by an indestructible something, whether it be enamel, gold, tin or cement, gutta-percha, or what, is thenceforward, so long as that covering continues, free from decay. We all knew that before he told us, but we never thought of it as we have thought of it since.

Dr. Black said one more thing to-day that set me thinking, which was that he had noticed in certain cases, in which the teeth had for a time seemed to be immune, that in about three years he had a new crop of cavities. My assistant has called my attention in years past to the fact that the first time a patient comes into my hands there may be a certain amount of work to be done; the second year there will be much less, the third year still less, and after that, to use an expression that was laughingly applied to me, the patients are "good for nothing." In other words, I have no more cavities to fill for many years. Why? Not because cavities have come in one, two, or three years, but because the tiny cavities which the microscope shows full well when slices are made, the cavities that exist beneath imperfections in the enamel, have developed. I questioned whether or no Dr. Black had fully spoken his mind on that point, and I hope when he concludes the discussion he will kindly enlighten us still further.

Dr. Conrad: Dr. Crawford in his remarks on "Tooth Decay" referred to the effect brain-diseases had on the fifth pair of nerves, and the influence on dental diseases. I recognize the fact that the brain has a great deal to do with the teeth, but my observations lead me to believe that it is through the pneumogastric nerve and the vaso-motor nervous system the teeth are affected. In the case of insane patients, I have found the cementum to be softened and wasting away. This I do not find to be due to lack of care altogether, and for that reason conclude it must be caused in some degree by the brain-trouble.

The amalgam question has received more attention than its importance would warrant, and the continued discussion does more harm to the standing of our profession than all causes combined, from the fact that some of our most celebrated members have become such earnest advocates of its merits, and recommend its almost universal use. I am prepared to make the statement that all amalgam fillings are imperfect after two or three years' use.

As to the use of arsenic for devitalizing the pulps of teeth, I can see no good reason for making a change, having used it for twenty-two years with perfect success. I have never had a so-called "lame tooth" from this cause.

Dr. Black: The hour is late, and, although I have taken some notes, I think I shall not say much as to the discussion. I am very

well satisfied with the discussion which has occurred. The conditions are very unfavorable here for the discussion of the paper that I presented, less unfavorable for the discussion of Dr. Johnson's paper.

It might seem to some of you that there was some collusion between Dr. Johnson and myself in the preparation of these papers, but I assure you that Dr. Johnson did not know anything of what I was writing, and that I did not know anything of what he was writing. But it seems that while I took one phase of this subject, he followed with the detail that logically would follow the presentation which I made, and I am very glad he did.

I want to speak of one thing, and to emphasize it as strongly as I know how, and I shall call it "Better Care of Children's Teeth." In this I agree with Dr. Johnson. Both he and I have limited the early filling of children's teeth as fully as it need be or should be limited. We must not destroy the confidence of a child. We must not break down the courage of a child. We must not injure the nervous system of a child. But, gentlemen, let us do our duty by children and fill their teeth in a permanent way at the earliest possible moment, and we will not have so much to do afterward. This thing of temporizing instead of making an endeavor to do permanent operations I detest. And yet I know there are cases in which we must temporize. Do not understand that I am going to make big gold fillings in the tooth of a child independently of the results to the physical constitution of the child, but I will first bring the child into a condition to make fillings and make them early. Many a gold filling have I made for a child eight years old, and I have had the pleasure of seeing those fillings still in place and the pulps not dead after the patient has come to adult age. The pulps of children's teeth do not die under fillings in as great a proportion of cases as they do in adults. Perhaps that may be due to the fact that I am always more cautious with children than with adults, but that is the fact in my practice. And generally I do not put any oxyphosphate of zinc under these fillings either. I do, however, and advocate the doing of this when the conditions in the case seem to render it necessary; that is, when I have a broad filling, and approaching pretty close to the pulp. I can shield it in that way, but in many cases I can shield it very much better by introducing

a bit of quill under my filling. It is more difficult to do, but it is better when it is done.

I do not intend now to speak of the details of operations, but what I did wish to do was to call your attention as strongly as I could to conditions of immunity that arise in our patients. What I wish you to do is to study that factor. There is a whole lot that we do not know about dental caries yet, and the study of this subject should be begun, and begun earnestly. It will take maybe fifteen or twenty years to elucidate it. These things are not done at once. They are not done quickly. They require much time, much thought, and much combination of effort; this man suggesting that from his experience, and the other man suggesting something else, and then, little by little, everything boils down. Let this comparison of thought go on. We have literally done nothing as yet on the question of immunity, and yet the conditions of immunity are confronting us continually, if we will look for them. They are around us continually. We see but few persons as a rule except those who come to us with something the matter with their teeth. It has been my habit to examine a great many persons who did not come with something the matter with their teeth, and I have seen not a few, but a great many persons, who go along through life with no decay whatever. They are in every community, and we may, if we try, observe those persons and examine their teeth. How often is it said that diseases of the peridental membrane attack those who have no decay; that we see this immunity of the teeth only when they come to us with that kind of trouble. We see, also, immunity occurring after there has been violent caries, if we have treated our cases well. What I wish is that the dental profession shall study that condition of immunity. For the present the study must be purely clinical. We have no means as yet of bringing it to laboratory study.

I want to repeat again what I wish, and the object of presenting this paper is to induce men to take up this subject as a subject of thought; carry it into their daily practice and make a clinical study of it, and report their findings until we can, in some way that I know not of, bring this matter into a position where we can make laboratory studies and determine the factors entering into it.

SECTION III.—Continued.

Choice of Filling-Materials for Specific Conditions of Teeth Ranging between Eight and Eighteen Years of Age.

PAPER BY S. B. PALMER, OF THE SECTION.

READERS of dental literature well recollect that the topic of etiology of dental caries has been under discussion for a score of years. Dr. Miller, Dr. Black, and Dr. J. Leon Williams have been most prominent and scientific in this line of study. The *Dental Cosmos* for March, 1899, contains a paper by Dr. Williams which distinctly shows that the three gentlemen agree in their findings that dental caries is produced by lactic acid which is formed by micro-organisms in contact with enamel, or that it is from the environments and not from pulp influences.

On the other hand the writer, previous to Dr. Miller's discovery, had taught that gold fillings in children's teeth, or those which are still being nourished by the pulp, are influenced by the thermal changes occasioned by the conductivity of the metal in addition to the external causes which are claimed to be the finale of the etiology of dental caries.

By reading the paper mentioned one can see that the question is pronounced settled, and many believe the statement, while others are in doubt. This subject is not introduced to be discussed upon differences of opinions. Local societies and dental literature will adjust this matter by *empirical* practice if science holds out against it.

The paper defines science so definitely as belonging to physics, where every point can be demonstrated by instruments and set forth in tables so accurately that there can be no mistake. And to

that limit the findings are correct. This explains the cause of the lengthy discussion mentioned. All that pertains to life is thrown out as metaphysical and beyond the reach of science. Thus the claim for adaptation of filling-materials to the conditions of young teeth is declared unscientific, which means that there is no more science in filling children's teeth than there would be in filling adult teeth. The real foundation of this unrecognized phase of science is failure to comprehend the evolution of electricity as it is known and taught in physics, to correspond with the evolution of minerals to become food for animals, which is done by life energy in plants. In this unfolding for higher conditions there is no break in natural laws. Life is the energy, and the agent employed is electricity, every advance being attended with higher life. In evolution from the vegetable plane to the lower animals we observe what is called instinct. In man it is distinguished by reason, mind, will, etc. The study upon this plane is called metaphysics, which is considered beyond the reach of science. That limit is of man's interpretation. Nature sets no bounds. Natural laws run through without a break, and the day is not far distant when chemistry will embrace both inorganic and organic, and physics will include metaphysics. The above seeming digression has been stated, to be placed on record, not as a prophecy, but as a *belief*, to await the time of its acknowledgment and reception.

Returning to the point in practice, we gather the following from our ideas of evolution and the functions of pulps in teeth. First, the human body is endowed with a life center, which presides over the development and maintenance of the whole system. Special organs are commissioned to do their allotted work. The pulp of a tooth derives its life energy and instinct from the common life center. The material is found in the blood. The energy is supplied to the system by food, which in evolution has become electro-vital energy, and a natural law governs the work to be done. Thus from the first deposit of dentin until a tooth reaches its normal condition, the pulp has the work to do and the instinct to do it, not merely to produce a tooth, but to construct one in every respect to match a corresponding one, in color, size, and form. To avoid introducing terms which are not yet recognized as science, I will instead speak of thermal changes as influencing the actions of the pulp rather than electric changes not yet understood. In degrees

of heat there is but little difference. It is well known that cold—so-called—at the point of freezing is abnormal to animal life and tissue. Also when animal heat reaches one hundred and five degrees a dangerous point has been attained. Those are the extremes. Nature works short of the extremes in building up the body. It is generally understood that the teeth of youth contain more organic matter in the dentin than those of adults, which renders dentin a conductor of heat or cold. It is well understood that nature does not produce or maintain healthy tissue against metals. Lead may be encysted and tolerated in the flesh because there is no thermal change. Should a portion of the surface be exposed to the atmosphere, diseased tissue would be the result. We have numerous object lessons in practice where gold crowns or gold bands pass beneath the gums and the gums testify that the conditions are abnormal. Porcelain crowns are free from such disturbances. The old pivot tooth with wooden pin caused no irritation. It would be a digression to state the true cause and the difference between the metal and porcelain.

The lesson answering our point is this: Thermal changes persisted in in the mouth interrupt natural circulation in the tissues. To draw a decided line between the conditions of teeth that may or may not be filled with gold is easy to be understood with the lessons and facts already presented. First, we will all agree that teeth of average density,—by which is meant of average non-conductivity,—such as are generally found at the age of eighteen years and upward, are proper teeth to be filled with gold. Please remember there is no definite line to be drawn by *years*, as clinical experience teaches that there are classes of caries where gold would be admissible for filling children's teeth at twelve years of age. The conditions to be observed are the depth of cavity or penetration of metal into the dentin and the structure of the tissue. Nature does not deposit the lime element against a metal or in dentin that is constantly affected by cold or heat. Teeth of normal structure are insulators to thermal changes. When a tooth is filled before it has reached maturity, calcification ceases on the surface in contact with a metal; this is evident from the shade of color seen through the enamel, which at first appears as a light brown, later, darker, tinged with yellow. Where approximal cavities are filled it is not as dark a shade as would be caused by faulty manipu-

lation, but nearly all partake of the same shade. On removing the gold the cavity is found to be lined with softened dentin in a state of decomposition. Those who have observed the difference where gutta-percha or cement has been used will recollect that the dentin is harder and of the usual color.

I am addressing myself to the younger members whose experiences may not have absorbed the popular teaching of the day that the selection of filling-material may be left to the operator as to which he can best manipulate under the circumstances. Later on it will be known that the preservation of children's teeth is governed by natural laws, one of which is that the pulp refuses to work against abnormal thermal changes,—scientifically speaking, refuses to work against a positive electric current. Many a dental practice has been injured by operators while gaining experience by filling children's teeth with gold. This practice does not antagonize the filling of teeth with gold or other metals when the teeth are matured, or when the pulps have been devitalized. While the pulp is active in building up dentin the life principle gives support to the organic portion of the dentin. Deprive the dentin of this maintenance, and, like a vine when cut at the root, the foliage withers and shows decomposition. The dentin becomes disorganized from within instead of from the causes known to produce caries externally.

This doctrine is pronounced unscientific because it deals with vital energy, which cannot be weighed or measured or demonstrated in the laboratory. Facts, however, may be derived from empirical practice to establish science in filling teeth for children as well as for adults.

General Address.

Dental Electricity.

By L. E. CUSTER.

IT seems quite in keeping with this subject that we should this year meet in the presence of the most wonderful and extensive plant for the production and utilization of electricity in all the world. Nowhere else can be found such marvels of mechanical and electrical ingenuity as are contained in the Niagara plant. Not only are the machines and devices for generating current remarkable in themselves, but the various appliances for utilizing it are unique and wonderful as well. And, as we are about to visit these plants, this seems an opportune moment for the consideration of dental electricity.

It was scarcely more than a hundred years ago that Galvani, while dressing frogs for his dinner, noticed the electrical effect of suspending them upon an iron grating with a copper wire, and yet the demonstration of an electric current by the muscular twitching of the frogs' legs, feeble as it was, was the beginning of the wonderful electrical demonstrations we see about us.

The experiments of Galvani were taken up by Volta, and the invention of the Voltaic battery soon followed; and even at this early date in the history of electricity this energy was utilized. The electrolytic property of the galvanic current was noticed by Davy, and the discovery of many elements was effected through the electrolytic decomposition of substances previously supposed to be elements.

The electro-magnet, the central organ in all dynamo machines, as well as in machines for using the current, was the third great

step in the development of modern electricity. This was the joint work of Oersted and Ampère, in the early part of this century, and was followed by the invention of the magnetto by Faraday, in 1831. While Faraday's machine, which was simply an appliance which provided for the rapid movement of a conductor in front of the poles of a permanent magnet, was the foundation of all modern mechanical appliances for generating current, it was not until electro-magnets were substituted for the permanent magnets of the field in 1866 by Farmer, Varley, and Siemens that the generation of electricity took a commercial form. Up to that time electric phenomena were scarcely more than laboratory experiments. The substitution of electro-magnets for the permanent magnets of Faraday's machine was the fifth and most important step from a commercial point of view. It made out of a toy which might be held in the hand the enormous machines of our city plants. The efficiency of the magnetto was limited by the degree to which a permanent magnet might be saturated, but the efficiency and output of the electro-magnetic machine or the modern dynamo is limited only by the problems of heavy machinery.

In this manner the feeble current of electric energy observed by Galvani was seized by the inventive, and the appliances for developing and utilizing it have increased in proportions and efficiency until to-day the electrical business in all its branches actually controls the world.

As the production of commercial electricity has increased, the uses to which it may be applied have been proportionately broadening. The invention of the incandescent lamp, the perfection of the arc lamp, and the invention of the electric motor went hand in hand with the improvements in dynamo machines, and many other appliances of less importance were devised; and the utility of the current has increased until to-day there is scarcely a field that has not been invaded by this fluid. Art and science owe their most recent progress to electricity; mechanics would be helpless without it, the successful practice of medicine and surgery can no longer be accomplished without its assistance, and the dental practitioner, while he has always employed it to a greater or less extent, to-day, more than ever before, finds new uses for this wonderful energy. The more recent and valuable advances in dental practice are due to modern electricity. Not only are many appli-

ances in both branches of dentistry being operated by electricity in one form or other, but the methods of practice are being molded by it. Difficult operations are made easy and complex ones are simplified.

No one knows what electricity is, and but few have attempted to tell us, yet its manifestations are all about us. It is the agent in the formation, growth, and death of all animal and vegetable organisms. It is the unseen hand at work in nature, the cause of barometric changes, the formidable agent which now and then shatters and tears the atmosphere, terrifying you with the crash of thunder. It transmits the enchantment of a look and the grace of a smile. It lights and heats our homes; it runs our factories and cars, and can almost carry our voice around the globe. By some it is regarded a property of all matter; some have thought it to be a vibratory molecular motion, some a fluid, some two fluids, some a motion in the ether, and some the ether itself. We can only study it comparatively. The resemblance of its phenomena to those of heat and light places it in that class of energy. We have heat, light, and electricity derived from friction, from chemical action, from magnetic action, and from the sun. Heat produces electricity, and electricity produces heat. If the junction of a thermopile be heated, a difference of potential will be established, or if a current be passed through the couplet the junction will become heated. A crystal of tourmaline, and many other crystalline bodies, when heated at one end show a difference of potential. Electricity also produces light, and will neutralize the polarizing effect of light. Hence, from the facts well known as to the nature of heat and light and their reciprocal action with electricity, we may infer many of the facts in regard to the nature of electricity. Heat and light are each regarded as a mode of molecular motion, and while electrical phenomena are of greater variety and oftentimes present themselves in complicated forms, yet all these, when simplified and understood, show that electrical phenomena are due to an energy not unlike heat and light.

Electricity is being largely used in medicine and surgery, but its uses are confined principally to electrolysis, light, heat, and the X ray, and, except in a very few instances, are more of the many properties of electric energy utilized. The stimulating effect of the faradic current is useful in many of the nervous lesions, and the electrolytic property of the galvanic current is of unquestioned

value in the treatment of hypertrophies. At one time it may be used to stimulate nutrition, to excite muscular contraction, and to exalt sensation, and at another it may be used to modify blood-supply, to relieve pain, or to destroy tissue. It may be used to operate the surgical engine, to give light, and it may be a medium of sound transmission for diagnostic purposes; and yet the range of useful applications as practiced in medicine at present is narrow when compared with dentistry. In general medicine, when the practitioner uses any electrical appliances further than the cautery or lamp he rises almost to the dignity of a specialist in electro-therapeutics. While this is true of the use of electricity in medicine, the same may be said of many other vocations of men, and when we correctly estimate the needs of each one the unbiased mind will agree that no profession, science, or art has such varied demands for its successful practice as dentistry, and no single agent meets more of these requirements than electricity as at present developed.

In the past the only practical applications of electricity were such as could be derived from battery power, but the output of the battery as a source of electric energy was so small as compared with the bulk, that even the room space was no small consideration. The care necessary to keep in good working order was a burden, and the great complication of the parts made electricity a formidable and uncertain agent. On this account, if the dentist used electricity at all, his battery consisted of but a few cells, and he was content to use only such instruments as required but little electric energy to operate them. As a matter of fact, the first applications of electricity were in the form of light power, such as would operate the armature in the shocking machine, or later on the electric mallet, cautery, and mouth-lamp. Altogether, the battery as a source of electric energy, while it was practical and successful in the hands of the few who understood it, did not prove so in the hands of the majority, and this cast a shadow upon the advent of commercial electricity as supplied at this day. Many no doubt have hesitated about installing modern electricity in their practice for no other reason than that it has not been a brilliant success as supplied by battery power in the past. But the hesitating dentist should bear in mind that he has no longer to do with the making of the energy, but with the use of it as furnished to him by two or three wires.

The supplying of commercial electricity has become an industry engaged in by corporations and companies for supplying cities and towns, and the operation of an electric plant on a small scale has been made so simple that many public buildings, hotels, and private residences operate their own.

When the dental office is equipped with commercial electricity as at present supplied, the current becomes as reliable as water or gas, and he is relieved of much care. Then, too, the instruments for using the current are highly perfected. The current is supplied at a given pressure, which is maintained at all times with wonderful accuracy, and the instruments using it are made for that pressure. With an electric system operating at 110 volts a lamp when burning plainly shows a departure of five volts either way from the standard. For this reason the operator need not at any time be concerned about the working of his electrical instruments when they are used upon the current for which they were intended. His supply is always the same, and he need only see that the connections are properly made. The electric light and heating appliances require no special care, and the other operations of electricity go on with like freedom from care on the part of the operator.

While we are in the dark as to the nature of electricity, it has, however, been found to produce results as accurate as a rule in mathematics, and when properly understood can be depended upon. A given current forced through a known conductor under a given pressure always produces the same amount of magnetism in an iron core, the same rise in temperature in the conductor, or deposits the same amount of metal from its solution. It is even possible for the electrician to accurately estimate beforehand the exact amount of heat that will be produced by the various arrangements of quantity, pressure, and resistance. The operations of electric energy are so constant and ever-present that they are made the basis for the measurement of electricity. The various forms of electric meters operate under one or a combination of well-known electric laws.

Nearly all operations in dental practice require the utmost accuracy in the application of energy, whether in the form of power, heat, light, or chemism, and principal of the characteristics of electricity is the accuracy of its operations under like conditions when desired. Moreover, the perfection and ease in regulating or vary-

ing its action for different degrees of intensity are important considerations. The speed for revolving the bur, the heat for the desiccation of dentin, for softening gutta-percha, for annealing gold, or for fusing porcelain should be to suit each case at hand. These conditions are not always alike, and electricity obeys the throw of the rheostat lever so accurately and quickly that, as if by magic, the will of the operator is felt at the instrument under operation. After a little experience his control over each appliance through the rheostat becomes almost automatic. The pianist in reading a piece of music does not think of the movement of each of her fingers as they glide over the finger-board, or of the management of the pedals with her feet, and so it is in the manipulation of a well-constructed electrical instrument. There is no effort at calculating how a certain thing is to be accomplished, but quite involuntarily the mental image of what is to be done being formed, it is done. The electric dental engine as perfected to-day increases or decreases its speed, stops or reverses at the touch of the operator, and all this is so easily done that after a little use it requires no effort on the part of the operator. The mental routine ceases and the control becomes automatic, and the attention of the operator, instead of being divided between the management of the instrument and the operation, may now be concentrated upon the latter.

The pressure of commercial current as used for incandescent lighting is practically the same at all times, so that each contact button of the rheostat always gives the same rate of speed to the engine or the same heat to heating appliances, and by a glance at the rheostat the rate of current flow is noted; or a predetermined requirement of energy for a given purpose or instrument can always be accurately obtained thereafter by using the same contact button. The flow of water from a faucet or gas from a burner cannot be more closely regulated than a current of electricity by means of the rheostat. The great variety of rheostat appliances that can be made for modifying the strength of the electric current, the fineness of their gradations, and the perfection of control, at once makes it possible to use the same current for the heaviest motor work or for the most delicate cataphoresis. No other energy at our command has such a wide range of action and is at the same time so easily and accurately regulated as electricity.

The cleanliness of electricity is another feature of this energy,

and one that is especially desirable in dental practice. The one thing prominent in the use of electricity is the cleanliness that may be preserved in whatever form it is used. There is no other device used for power purpose that is so cleanly as the electric motor. Water power and the small gas engine are the only other available power appliances, and these are open to serious objections. Water power is not always available, and the gas engine has so many undesirable features that but few dentists have used it. The latest electric motors are lubricated with thick oil, and the bearings are so designed as to provide for constant lubrication and at the same time preserve perfect cleanliness. It may therefore be placed at any convenient point about the chair without fear of soiling the immediate objects.

The electric light has advantages over other forms. The atmosphere is not robbed of its oxygen, and the air is not vitiated by the products of combustion. A small light can be inclosed within the mouth without discomfort, or a large one may be hung at any desired position about the chair. The heat radiated from the incandescent bulb is not enough to set fire to objects with which it may come in contact, so that it can often be used where a gas or oil flame would not be permissible.

While the cleanliness and purity of electrical heat would alone recommend it for use in a dental office, there are some processes in dental practice to which electrical heat, by its purity and wide range, is especially adapted, as, for instance, the purity of heat for annealing gold or for fusing porcelain, or the range of heat from the softening of gutta-percha to the melting of platinum. Pure heat is of solar origin, and yet when heat is produced by electrically heating a conductor which does not oxidize or undergo any change, as is the case with a platinum or iridium conductor, this heat is practically pure. It is without gas or odor, and can be easily regulated. The range of electrical heat depends upon the manner in which it is produced. If it is obtained by the resistance of the conductor, then the highest limit of the heat will be the melting point of that conductor. If platinum or iridium be used as the conductor, for instance, the range of heat will be as high as the melting point of these metals, or about 3600°; if it is the heat of the arc, it will be nearly 6000°. While the latter is the most intense heat that man can produce, it can at the same time be manipulated by the hand of the operator

without inconvenience or danger to life, again illustrating the fitness of electricity in dental practice.

A feature characteristic of electric energy is the very small amount of noise in its operations. As a matter of fact, there is no noise in any operation of electricity itself when properly used, except the arc tone or the sharp report following a voltaic discharge. The sputtering of the arc light is due to bad carbons or imperfect adjustments, and the noise of the motor is due more often to badly shaped armatures and poor adjustment of the brushes than the flow of the current. These are faults of the instruments themselves, and not of the energy which operates them.

The other applications of electric energy go on without any audible sound. An oven may be heated to the melting point of platinum, and there may be a horse power of energy in operation, but it cannot be heard. The incandescent lamp glows, and all galvanic processes go on without sound.

Another feature which commends the use of electricity in dental practice is the flexibility of the system. For the operation of engines and lathes, instead of using one large machine for all purposes, which is necessary where other motive power is used, small motors may be used for the several kinds of work. By the use of flexible cord the current can be brought to any desired place in the apartment and a separate motor may be used, one to operate the dental engine, one to operate the lathe, one for the fan, and as many as are desirable for other purposes. In this way a motor may be used which is especially adapted for a particular kind of work as to capacity and speed, and the operation of several such motors will be more satisfactory and economical than where one large motor is used for all purposes.

There are four commercial currents which are in use at the present time, but not all are suitable for dental purposes. The arc light and 500-volt, or car current, are of too high pressure to be brought into the dental office with safety. Moreover, the appliances which can be operated by them are not of great variety, and they possess no advantages over appliances which can be used on currents of lower pressure. Where no other current is available the careful dentist, however, may charge a storage battery from these two currents, and he may operate a suitably wound motor or an oven on the 500-volt current, but beyond these applica-

tions the higher pressure currents are not of much value. In a few instances a motor-dynamo has been employed by the dentist to reduce the 500-volt current to 110 volts, which can then be used with impunity.

The third commercial current, the alternating, is found as a rule in small cities and towns, where the field of distribution extends over a large area with few consumers. This consists of a primary current, a transformer, and a secondary current. The primary current is sent out at a high and very dangerous voltage, and courses through all the transformers. From these transformers, which are supplied to each consumer, a secondary current of safe voltage is led into the house. The usual pressure of the secondary or house current is 52, or 104 volts. This is perfectly safe, and meets all the requirements for lighting and heating. When used in the dental office, however, its uses are restricted almost entirely to the same, and only under certain conditions can it be used for power purposes. This current can light the office, operate the mouth-lamp, and it can by its heating effect be used to operate the cautery, the electric oven, and gold annealer; but beyond these applications it is of little value. It has no electrolytic effect, and it cannot therefore be used for such purposes. It cannot be used for plating or for cataphoresis, and possesses no especial therapeutic value.

The fourth and last current which may be used in the dental office is the Edison, or constant current. This is the ideal dental current, and fortunately it is the one most frequently met with. This system is the most economical and satisfactory for supplying heavy current within a short radius, and it is for this reason that we find it in common use in the business portions of nearly all cities. It is, moreover, so easily installed and operated that many people have their own private plants, and there is scarcely a large building, hotel, or office building but which operates a plant of this kind.

This current is usually supplied at 110 volts pressure, which is maintained with wonderful accuracy at all times. This gives a range which covers all the applications that may be made in dentistry. It is high enough for heating and lighting and the operation of motors, or with a properly constructed rheostat a current of the fraction of a volt pressure can be obtained from it for the most

delicate cataphoric work. Another feature of value is that when working at this pressure a heavy current for melting platinum and for other heating purposes can be obtained more economically than when a higher pressure is employed. In fact, a current of a higher voltage than that at which the Edison current is regularly supplied cannot be employed for many purposes without a loss in wasteful resistance.

The Edison current at 110 volts gives the widest range of useful applications, and it is for this reason that I would call it the ideal dental current. Being perfectly safe, and at the same time of a voltage to cover the highest requirements, it may be used to light the office, to operate the motor, to heat all heating appliances; it may be used as a galvanic current, and with the interrupter will produce the faradic. It may be used for the removal of tissue and for stimulating nutrition. It can be used for electro-plating, for cataphoresis, and for the X ray. In short, there is no effect produced by electricity or by other commercial currents which is found to be of value in dentistry but which can be obtained from this current. It possesses the desirable virtues of all the others combined.

I will not consume your time by going into the details of the various applications of electricity that are being made in dentistry at present, further than a brief *résumé*. Under the head of power, the electric mallet has certain advantages over other forms of malleting which make it a highly valuable appliance. The electric motor has no equal for power purposes in the dental office. Its cleanliness, freedom from noise, its perfection of control and high rate of speed, are not to be found in any other power appliance. The supplanting of the pedal engine by the electric engine has done much toward giving a professional tone to a part of dental practice which heretofore has been necessarily on the order of mechanical labor. The movements of the dentist while operating the pedal engine differed but little from the performance of a scissors grinder in the eyes of the public. The electric engine has added tone to the dental office and dignity to the dentist. The electric lathe in which the motor is made the lathe-head itself is not only an ornament to the dental office, but does away with much machinery. It is self-contained, and in a few inches of space we have a complete lathe, which heretofore has been the central figure in the laboratory. The electric motor has other uses. It may be used to compress air, and,

while most of the manifestations of electricity are accompanied by heat, it may at the same time be used for keeping the office cool. The electric fan is a luxury to both patient and operator.

In taking up the second property of electricity we are surprised at the large number of useful applications of electrical heat in dentistry, and, moreover, the wide range of heat in meeting them all. There are no less than a dozen practical uses that are being made of electrical heat alone. It may be used for the desiccation of dentin, for softening gutta-percha, for warming water, and for the sterilization of instruments; for annealing gold and fusing porcelain, for igniting the gas or alcohol flame, and for fusing platinum; for the therapeutic application of heat, and for cautery purposes. The most humane appliance in dentistry is the use of the warm air tip for the desiccation of sensitive dentin. Electrical heat, as no other heat, can be accurately regulated by means of the rheostat to suit the requirements, and it is possible to produce a blast of air precisely at blood heat. At the other extreme, the electric current can be used to heat the cautery and root-drier, and to fuse platinum. Then there are the two processes in dentistry to which electrical heat by its purity is especially fitted, for the fusing of porcelain and annealing gold. When we consider that five years ago the number of porcelain workers of the whole dental profession was scarcely more than a hundred, we can in a measure realize the utility of the electric oven. The electric annealer produces a heat for annealing gold of which a prominent teacher says, "The most perfect method yet suggested is through the medium of the electric gold annealer. Even to operators who have been accomplishing apparently satisfactory results by other means, this appliance will soon reveal a working quality to the gold which seems impossible of attainment in any other way." In the same manner gutta-percha may be softened to any degree, instruments may be tempered to any hardness, and alloys may be made without oxidation.

The electric lamp is one of the best means for mouth illumination and for diagnostic purposes. A half-candle-power lamp may be used in any part of the mouth without discomfort to the patient.

The electrolytic property of the constant current may be used for cataphoresis and for plating. I may be questioned by some in calling cataphoresis an electrolytic process, but, inasmuch as it partakes largely of a transfer of elements and is accompanied by phenomena

not unlike those present in ordinary electrolysis, the ground taken here has as much support as if cataphoresis were classed as a distinct property of the electric current. However, the efficiency of cataphoresis for the treatment of sensitive dentin, for the projection of agents into the pulp for its destruction, for the lining of root-canals, for the treatment of pyorrhea, and for the bleaching of teeth has never been questioned.

The X ray has quite as appropriate and useful a place in dental practice as in any other field. It is my belief that as the X ray appliances and their working become simplified and the dental uses for it become known, this means of diagnosis will find extensive use in dental practice.

It is indeed wonderful when we consider that two flexible wires scarcely larger than a thread can convey to the operating table sufficient energy to operate a one-horse-power motor, and it is still more wonderful when we consider that the same current that operates the motor can, by its heating property, be used to fuse a set of teeth, to melt our platinum, to anneal our gold, to soften gutta-percha, to warm water, or to desiccate dentin; by its electrolytic property to plate our instruments, crowns, and bridges; to carry an anesthetic into the dentin, to stimulate nutrition, or to destroy tissue; by its incandescent effect to illuminate the mouth, and by the X ray enable us to see through the body. When we consider that all these widely different requirements of energy, both in property and quantity, are to be obtained from the same wire, we can in a measure estimate the value of such an agent in dental practice.

When we look back over the comparatively short history of the dental profession, we are struck with the wonderful and rapid progress that has been made. Each decade has been marked by improvements that have revolutionized preceding methods of practice, and with the advent of commercial electricity a subtle fluid has found a place which is not only modifying established methods, but threatens to become the controlling influence in improvements that may follow. The great variety of methods and operations which go to make up the successful practice of dentistry calls not only for broad attainments on the part of the dentist, but for a great variety of agents and appliances. The many properties of electricity, every one of which is of service in dentistry, are but slight indications of what part electricity will take in the dental practice of the future.

If even at this day, when we do not know what electricity is, it has become the most useful and extensively applied energy, covering all the fields of human activity, what may we expect in the future? Just as the various tissues and organs receive their nutrition and growth through the complete net-work of vessels carrying the life-blood to and from them, so are the needs of men being supplied through a complete net-work of electrical conductors with an energy as potent and useful in its applications as they are numerous. The coming developments and applications of electricity promise even more, and the practice of dentistry, as well as the other professions and arts, will to a large extent be influenced and aided thereby.

SECTION IV.

Histology and Microscopy.

Physiological Reasons for Supposing that Dentin and Enamel in Pulpless Teeth may be Nourished.

PAPER BY JOSEPH HEAD, OF THE SECTION.

THE case I wish to present for the consideration of the learned gentlemen present is that of a young lady whose slightest systemic derangement was often followed by obstinate pulp-congestion.

On the 30th day of March, 1897, she came to me with such congestion in the pulp of the left upper first permanent molar as made it necessary to remove the pulp. Bleeding and arsenical applications were uselessly tried; cataphoresis was found unavailing against such tissue, and finally cocain was injected and the pulp thoroughly removed up to the tip of each root by means of a Donaldson nerve-broach.

The canals were filled with oxychlorid of zinc June 6, three months and six days after the trouble began; but in the mean time the first and second upper bicuspids on the same side gave such trouble that their pulps had also to be removed. Thus by June 15 the pulps of the left upper first permanent molar and left upper first and second bicuspids had been removed, and all the canals were filled with oxychlorid of zinc. The patient was then dismissed.

In the following December she returned with a congested pulp in the left lower third molar, and, in the light of past experience, the tooth was extracted. The relief was, however, but temporary, and on the following day she again returned, declaring that hot and

cold water gave her unbearable pain. I examined all of the teeth containing living pulps, and, as none responded to the tests, I finally in desperation began to test all of the teeth; and with most startling results. For when a hot instrument was placed against the molar from which I had extracted the pulp six months previously, the pain was intense. The pulpless first and second bicuspids also responded, but to a less degree.

On opening the first permanent molar I found that the oxychlorid of zinc filling had become liquefied, and that the entire dentin had taken on such irritation that it could not be touched without causing the patient to turn pale. In the bicuspids the oxychlorid of zinc was hard and normal.

In previous years I had noted cases where dentin was sensitive in spots after a pulp had been newly extracted, and I attributed this sensibility to possible prolongations of the protoplasmic material of the cementum, but in the case just quoted the sensibility of the dentin was general, and the pain was quite as intense as if a live pulp had been distributing nerve-tissue and nourishment. All three teeth were reopened thoroughly, and daily applications of chlorid of zinc were made until the sensibility was brought under control, when they were again filled. Six months later the teeth were still sensitive to heat and cold, but up to the present time the sensibility has steadily diminished and the patient has finally had entire relief. One fact concerning this report should be especially emphasized. The pulp was removed from a molar May 22, 1897, and for over one year and a half the dentin remained sensitive and presumably alive. Thus by a sort of human vivisection we have conclusive proof that dentin has means of sensitory communication and avenues of nourishment independent of the pulp.

As Dr. Williams ably stated in his paper, published in the March *Dental Cosmos*, "Facts should make theories, not theories facts," and whether science has or has not been able to discover the means of pulpless dentin nourishment and nerve supply, the above recorded clinical phenomena simply prove that the microscope in this case has been defective. But are these phenomena incapable of being satisfactorily explained by facts already well known? Let us see.

The ultimate nutrition of all the cells in the body is performed by osmosis of the liquor sanguinis, which weeps through the thin walls

of the capillaries. The tooth has two avenues of nourishment, the pulp and the cementum. The pulp opens primarily into the dentinal tubules, but beyond the dentinal tubules the liquor sanguinis in nourishing the tooth-substance must permeate by osmosis pure and simple.

The cementum communicates with the intertubular spaces and dentinal tubules of the dentin by means of its lacunæ, and osmosis can take place through it to all parts of the tooth, just as osmosis from the pulp occurs; while the avenues in the cementum not being so large as those of the pulp, the process must be slower and less effective.

Thus the apparent puzzle seems to be solved. There being but two means of blood-supply,—namely, the pulp and the cementum,—each using the process of osmosis for ultimate nourishment, it is clear that if the pulp be destroyed the cementum must undertake the work formerly performed by both; and that it does do this seems to be emphasized by the fact that the cementum tends to exostosis and thickening when the pulp is gone, as though making preparation for extra effort.

If it be said in refutation that nerve communication between the dentin and the cementum has never been found by the microscope, it may be answered that the microscope has probably not yet found the half of what it is destined to find, and that it is far easier to believe that the microscope has overlooked minute sensitory plasma than to believe that sensitory impulses between the dentin and gum are carried on by a method kindred to the Marconi system. And, furthermore, if the dentin can be nourished by a process similar to osmosis, why cannot the enamel be nourished in a similar way? Why should not the phosphate of calcium or some kindred salt percolating through the tooth gradually modify the density of the enamel-rods or their sheaths? My daily excavations tell me unmistakably that the enamel of five years is less hard than the enamel of forty years; my daily observations make me feel that the enamel grows harder in course of years, long after the enamel-organ has been destroyed. But whether this hardening is done, as I think, by a further calcification of the rod sheaths, or whether the hardening is due to a change entirely within the enamel molecule, just as the carbon of coal is the same as the carbon of the diamond, I do not presume to affirm.

I only know that since pulpless dentin has been observed to live and have sensation for over a year, such pulpless dentin must have nerve supply and nourishment independent of the pulp. And if nutrition is possible to the dentin by osmosis through the cementum lacunæ, it is equally possible to the enamel by the same means; and when we consider how frequently enamel is known to change its color from permeation by blood plasma charged with broken-down hemoglobin, not only the possibility, but the probability, of enamel nutrition by osmosis is forced upon our consideration.

SECTION IV.—Continued.

Constitutional Deterioration a Cause of Dental Caries, or the Dental Problem of the Twentieth Century.

PAPER BY H. T. HARVEY, OF THE SECTION.

WITH the dawn of another century just before us, we are closing one of the greatest eras ever known in human progress, an era resplendent by marvelous achievements, the rapidity of which has proven a phenomenon to the closest observer, and is surpassed only by the results of such progress.

In no other walk of life have there been greater achievements than in the profession of dentistry. Not only has the profession of dentistry been brought forth and developed principally during the past hundred years, but the necessity for its creation will be credited to this same nineteenth century in history.

Not only has nature been artificially supplemented, disease and decay having been treated with a marked degree of accuracy and apparently with desirable results, but as the life of this grand nineteenth century is ebbing away, we are brought face to face with another phase of duty as a profession. True, it is a problem, but not unsolved. The subject of constitutional deterioration should be of vital interest to each one.

I do not desire to leave the impression that disease, as well as caries of the teeth, did not exist in the early centuries. I will quote authorities which will establish the fact that they did exist; but I do wish to convince you that disease and caries of the teeth did not become prevalent to that degree that required the inaugura-

tion of the dental profession until the present century. Civilization and the advanced mode of living have brought with them grave errors that are as deleterious as they are modern. The amazing statement, which cannot be discredited, has recently been made, that no person with carious teeth is *ever healthy*. Note the significance of that statement, which I believe to be true. Every person with decayed teeth has ill health. The disease of the body is either influenced by the carious teeth, or the systemic disease has destroyed the tooth-structure,—it may be both. That decay of the teeth is not purely a local disorder, but is an expression of a general disorder involving the whole body, and as such is a symptom of a depreciation of the vital resistance and the physical powers of the individual, is surely proven by the almost universal existence of dental decay among civilized people, and is corroborative of the fact that the race is deteriorating.

The human body is naturally proof against germs. There are no parasitic bacteria which are capable of colonizing upon a thoroughly healthy organism. Disease is cultivated as we cultivate corn. The soil has to be properly prepared in order to produce disease. Persons who take no exercise, eat things which ought to be buried, and transgress the laws of health daily, are more susceptible to disease than others. There are seventeen thousand diseases, although there are but few ways of acquiring them, likewise few ways of getting rid of them.

Why, with our improved conditions of life, are we so rapidly deteriorating physically, mentally, and otherwise? Insanity and imbecility have increased fifty per cent. the past fifty years. Should it not give rise to some very earnest and practical thinking as to whether the methods of feeding our bodies are such as are calculated to make tissue and good teeth, considering that tissue and teeth are made of what we eat? When Moses lived in Egypt, he lived close to nature. He never required the services of a physician or a dentist. That our Creator knew best how man should live, we only have to look at the plant and lower animal life. One never finds mold or colonies of bacteria on the leaves of a healthy tree; the leaf protects itself against the attacks of fungi. The mighty Cave of Fingal teaches us the secret of the universe, that here as everywhere, in ways unknown to man, the elements pay homage to their Maker.

The history of the world still gives to us modes of heroic effort and sacrifice. True ideas still live,—the thoughts of Phidias in marble! of Plato in philosophy! of Socrates in morals! What if it be true that time has wrought changes; the influence of ancient history comes down to us like a fixed star. The star itself may have gone out in darkness years ago, but the waves of brilliancy which left it previous to its destruction are traveling toward us still, and fall in silvery pulsations on our profession to-day.

Plato recognized the results of tissue-disintegration. Galen (131 A.D.) said that the lack of nutrition weakened tooth-structure. Paul of Ægina, in 636 A.D., said that indigestion was the cause of tooth-decay. Authorities in our own day recognize the close relation of systemic disorders to disease of the teeth. Miller, in the "ten general causes for caries of the teeth," ascribes three to constitutional causes.

The etiology of caries of the teeth ascribing it to the action of micro-organisms had not been presented until some thirty years ago, by Leber and Rottenstein.

We recognize that caries is dependent upon the presence and proliferation of micro-organisms. These organisms attack the organic material and feed upon it. They create an acid which removes the lime-salts. There is acknowledged a difference between this and decalcification, though both are caused by acids. The difference is due to the presence or absence of micro-organisms. Experiments have proven that caries can be produced artificially, but when germs are excluded caries does not occur.

There are two stages of caries of the teeth: The first is partial decalcification; the second a stage of digestion and solution of tissue, both being caused by acids, the first a ferment, the second the result of micro-organisms on sugar taken into the mouth, either as sugar or as starch, the latter being converted into sugar by the ptyalin of the saliva. In this second stage, when such decalcification occurs, the micro-organisms are able to penetrate the soft tissue, where, feeding upon the sugar in solution, they form fresh acid and proliferate freely. Thus they destroy the matrix and cause complete disintegration of tooth-structure.

We know that the stomach always contains germs. In the scientific investigation which I undertook two years ago, the results of which I gave in a paper at Baltimore, June 3, 1898, I showed: 1.

That caries of the teeth was almost the universal accompaniment in cases of chronic indigestion. 2. That only four per cent. examined possessed sound teeth. 3. That they were found in cases of simple dyspepsia. 4. That the smallest number of sound teeth was found in cases of hypopepsia. 5. That the highest degree of absence of dental caries was found to be where there was present a normal or excessive amount of free HCl in the stomach fluid. 6. That non-flesh-eaters, savages, primitive peoples, and lower animals have the most sound teeth. 7. That lack of exercise and the employment of soft foods encouraged deterioration of the teeth and developed general constitutional disorders. 8. That the employment of wholesome, digestible food-substance, free from bacteria, promoted good digestion and preserved the natural teeth, retaining also the general tonicity of the body and of the digestive organs.

I am pleased to give to you the result of four hundred and twenty-four additional cases; the observation of Dr. J. H. Kellogg, superintendent of the Battle Creek Sanitarium, Battle Creek, Mich. The cases were studied by the exact methods of investigation which are in use in the Laboratory of Hygiene of the Battle Creek Sanitarium, as shown by the following data of examination:

M.....

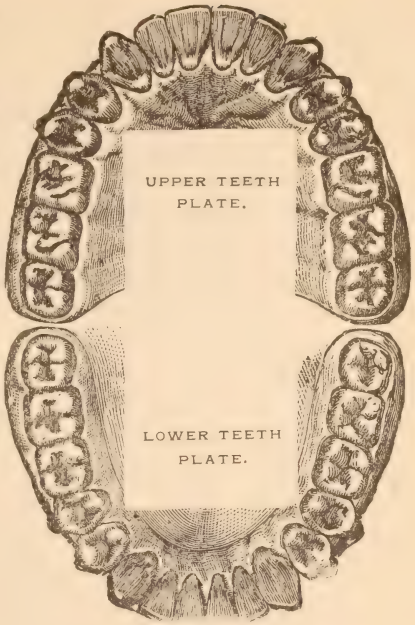
Examined.....189 .

1. Name .....
2. Age .....
3. Number of sound teeth.....
4. Number of decayed teeth.....
5. " " " " filled .....
6. " " " " not filled.....
7. Number of teeth replaced by bridge-work, plate, or otherwise.....
8. At what age did teeth begin to decay?.....
9. Were symptoms of indigestion noted in connection with or before decay of teeth began?.....
10. Has any connection between decay of teeth and condition of stomach been observed?.....
11. Has soft food been largely used to the exclusion of food requiring mastication? .....
12. Have you used largely of flesh foods, and, if so, did you begin the use of meat at an early age?.....

.....

13. Have you any other habits as regards diet which you think may have had any bearing upon the condition of your teeth in preserving them or giving rise to decay?.....

NOTE.—Please ask the patient each of the above questions and get as full information as possible respecting the history of his teeth. Mark on the diagram the teeth which are lost or decayed, using the following designs: On teeth which are lost, a straight line; teeth which are filled, a cross; if the teeth are replaced by plate, underscore the word "plate," connecting with it by brace the teeth which are thus replaced, except in case in which all the teeth are on the plate.



In the history of each case specific data were obtained on this blank. The chemical and bacteriological researches were conducted simultaneously, developing the special character of the ptomaines and micro-organisms of the mouth and stomach as a result of bacterial growth.

The stomach fluid is obtained by administering a sterile test meal consisting of one and one-half ounces of wheat granose flakes, seven and one-half grains of salt, and eight ounces of sterilized water. The test meal, together with the stomach fluid, were withdrawn by means of a stomach tube, after remaining in the stomach one hour. By these exact methods we are enabled to determine the qualitative and quantitative reaction of the digestive agents, obtaining the products of fermentation, the co-efficient of digestion in addition to residue of pus, blood, and the total estimated contents of the stomach fluid. We also obtain the number and note the general characteristics of the microbes which inhabit the stomach.

With each case examined there was obtained sufficient saliva for study to ascertain whether it contained an acid or alkaline reaction.

Dr. Kellogg found only two per cent. sound teeth in all the cases of chronic indigestion, and the extent of decay of the teeth was found to be in direct relation with the gravity of the stomach disorder. In hyperpepsia the average number of sound teeth was

found to be nineteen, whereas in hypopepsia the average number was fourteen. In simple dyspepsia the average number of sound teeth was twenty-two. In the worst form of hypopepsia, that accompanied by infection of the stomach fluid, numbering one hundred and fifty in all, or more than one-third of the total number of cases, the average number of sound teeth was only fourteen, whereas in simple dyspepsia, without infection of stomach fluid, the average of sound teeth was twenty-four.

In gastric catarrh and other graver forms of gastric disorder the average number of sound teeth was still smaller, or only about one-half the number found in simple dyspepsia. It is very interesting to note that the figures obtained in the study of these four hundred and twenty-four cases were nearly identical with those obtained in the smaller number reported upon in the previous investigation. The average number of sound teeth in simple dyspepsia was exactly twenty-four.

The environment of persons afflicted with any general disorder, and especially with a malady of the stomach, is conducive to the production and maintenance of the bacteria which induce putrefactive decomposition in animal matter. Bacteria which swarm decayed teeth pass with the food into the stomach, and cause irritation such as gastritis.

Some few cases I studied at the above laboratory, where I obtained cultures from the mouth and decayed teeth, together with the bacterial cultures obtained from the stomachs of the same persons, confirm my opinion that there is an intimate relation existing between the stomach and the teeth.

Stark even maintains that there is frequent association between caries of the teeth and enlargement of the cervical lymphatic glands.

I desire to refer to some of the predisposing causes of carious teeth: a deficiency of lime-salts in the body, rachitis, tuberculosis, syphilis, defective structure; not the least important is the fact that certain diseases give rise to a certain acid reaction in the mouth.

Frey maintains that almost all constitutional disorders produce an alteration of the salivary secretions. This may act directly upon the teeth by acidulous reaction, but more likely indirectly by constituting a favorable condition for the development of bacteria.

As I have mentioned, decay of the teeth is not a local disorder, but is an expression of general disorder involving the whole body.

The tissues of a healthy person are capable of resisting attacks of bacteria when themselves wholly intact. It is only when a number of tissues become deteriorated by neglect to comply with the condition requisite to the maintenance of perfect health of body that they become vulnerable to the attacks of microbes.

A thoroughly well man cannot contract typhoid fever, etc. It is only the deteriorated man that is capable of getting sick through the agency of these so-called pathogenic organisms. Our bodies are endowed with power to destroy germs of every sort.

The animal whose body is deteriorated by fatigue, by starvation, by exposure, by excessive heat or excessive cold, or by any means whatever which leads to exhaustion of the vital powers, becomes subject to diseases against which it was previously proof. Those who escape disease are persons who are immune through a high degree of vitality which they possess. A disordered skin is simply an expression of general vital deterioration, as the result of which the body has lost the power to resist the encroachments of germs. Not only the skin, but every organ of the body has been brought down to a lowered condition of vital action.

Decay of the teeth is, in my opinion, an indication that there is a general deterioration of the whole body whereby the tissues have lost their power to resist the encroachments of organisms.

Soundness of the teeth is in itself one of the best evidences of general soundness of the body. The man suffering from a torpid liver can never be cured of his disorder by the treatment of his liver alone. The only way in which his liver can be cured is by lifting the whole man upon a higher level; the whole body must be rebuilded, the tissues renovated, the vital tone improved. These measures make a man a whole and a better man.

The same principle must be equally true in relation to the teeth. Decay may be arrested and the mouth cleansed, but the general conditions which caused the carious teeth will recur and decay will continue.

Where is the relief, not alone, but in conjunction with all other measures of prophylaxis and hygiene? The reform must come in dietetics and a greater degree of exercise. I will briefly refer to the food elements necessary for the maintenance of bodily health and strength.

There are three classes of food elements necessary:

First. Proteids, represented by albumen, gluten, fibrin, casein, white of egg, lean meat, curd of milk, large peas, beans, lentils, and nuts.

Second. Fats, found in very limited quantities in grains, but very abundantly in nuts.

Third. Carbohydrates, represented by starch and sugar in various forms.

These elements are found in combination in most vegetable foods. Grains contain starch and proteids, very little sugar, and practically no fats. Fruits contain sugar, dextrin, usually acids, very little albumen, no starch or fats. Nuts contain a large amount of proteids or albumen,—more than an equal weight of beefsteak, —fifty per cent. more of their weight of fats and practically no sugar and no starch. Legumes (peas, beans, lentils) contain a large amount of starch and a very high proportion of proteids, more than are found in ordinary flesh foods.

Vegetables, like potatoes and other flesh roots, consist chiefly of starch, very small amount of proteids, and no fats. Proteids are necessary for building up the blood and active tissues, muscles, nerves, etc. Fats and carbohydrates are necessary to maintain heat and energy. After extended experiment, it was found that to best nourish the whole body the proportion should be as follows:

	Normal.
Proteids—number of food units per diem	425
Fats—number of food units per diem	330
Carbohydrates—number of food units per diem	1930
Total	2685

Upon application I will furnish sixty-nine different food combinations with exactly that proportion. A pound of peanuts contains more proteids than a pound of beefsteak, and besides, contains nearly fifty per cent of fat. The same is practically true of almonds. To get the phosphates and carbonates which nourish and replenish tooth-structure, a granose cake or an extra slice of Graham bread will perfectly give all the lime and other nutrient qualities.

Flesh food, as is well known, is more stimulating than are the products of the vegetable kingdom. While this is true, it should also be remembered that stimulation is not conducive to endur-

ance, and that in the long run the flesh-eating animal cannot compete with one which takes its food at first hand from the products of the vegetable kingdom, which nature has especially designed for the storage of energy to be used by animals.

A well-balanced dietary may easily be obtained from the vegetable kingdom alone, and both health and strength may be maintained without flesh foods. This fact is not new, as the vegetable kingdom is recognized by physiologists as the original source of food material. Subsisting on flesh, one is taking food at second hand after poisons have been filtered through the same, and many of which remain in the flesh.

That a non-flesh dietary is capable of sustaining health, life, and vigor is demonstrated by the experience of part of the human family, three-fourths of which are practically vegetarians.

Of the 50,000,000 Malays of the Archipelago Group, the principal diet is rice. Of natives of Portugal, the diet is olives and ripe figs, oranges, hot chestnuts, and bread. Of the Yuma, Apache, Sioux, and other American Indians, the principal diet is corn, also of the natives of Mexico. The Arabs of Egypt eat brown bread and cucumbers and dates. The Bedouins of the Assyrian desert subsist and thrive on dried fig meal, wheat cakes, and dried cheese. Of the peasants of Italy and Greece, the diet is boiled chestnuts. The peasants of Turkey and Bulgaria and other European people enjoy sound teeth while living on a frugal diet.

The amount of exercise required daily by the adult is at least one-sixteenth of his total capacity for work, or not less than three hundred thousand foot-pounds or its equivalent. The indolent man suffers almost as much as does the half-starved Arab. An excess of material that cannot be used and is imperfectly oxidized is not easily eliminated, and accumulates so much poison as to burden every organ and tissue and to hinder every bodily function.

Exercise maintains the suppleness of the tissues, the purity of the blood, the caliber of the arteries, the mobility of the chest, the strength of the heart, the soundness of the digestive and eliminative functions, the activity of the brain and nervous system, and the soundness of the teeth. It makes a whole man and keeps a man whole. The feverish desire for gain on the part of many stimulates them to violate the laws of nature, and the result is premature decay and a broken constitution. At the time when life

should be at its very ripest and sweetest we find ourselves broken-down specimens of humanity, traveling from one health resort to another, vainly attempting to coax back from nature that which was so ruthlessly plucked from her,—that priceless treasure, Health.

SECTION V.

Materia Medica and Therapeutics.

The True Status of the Pulpless Tooth.

PAPER BY D. D. SMITH, OF THE SECTION.

THE pulpless tooth as an organ is unique, and sustains unique relations among its confederates. It may be defined as a living organ with the greater part of its substance dead matter. Imperfectly understood, it has been perhaps more frequently the subject of experimental conjuration than of rational and scientific treatment. It seems to live in an atmosphere of suspicion and prejudice, for reasons not well defined nor consistently explained. In the minds of the laity it is universally associated with a "blackened" crown and rapid decay. In the profession it is almost as commonly esteemed an erratic organ, with sporadic disturbing tendencies impossible to control. By some it is thought to be of necessity an indicator of weather changes, and an inevitable sleep-disturber. Without accepting any of these as necessary conditions, we know that, as frequently treated, it is the cause of many aggravated and serious disturbances, as pericementitis, facial neuralgias, dental abscesses, and various pathological conditions of mouth, ear, and brain. This paper is contributed in the hope that the status of the pulpless tooth may be better defined, and that methods of practice may be suggested for its better conservation.

The largest and most practical conception of a tooth is not that which comes from studying it in its anatomical make-up of pulp,

dentin, enamel, and cementum, with all the microscopical minutiæ relating thereto as found in the text-books; it comes rather with the view presented when studying the sources of its derivation, development, sustentation, utility, and kindred phenomena. For practical comprehension of the pulpless tooth no better division can be made of it than the natural one of crown and root, for in this we have distinctly marked the two sources of sensation and nutrition distributed to it. Consideration of a tooth, whether physiologically or pathologically, should never lose sight of the fact that its utility is wholly dependent upon its secure attachment in the alveolus, and that this attachment is not alone mechanical, but that it is a vital living union practically, if not wholly, *independent of the pulp.* This attachment or living union, so very important for both comfort and utility in the tooth, is passed over and dismissed in the text-books with the remark that it is an articulation belonging to the order gomphosis.

The permanent saving of a pulpless tooth rests upon the fact that there is a source of nutrition to the cementum maintained independently of pulp action, and that this nutrition of the root is practically unaffected by the destruction of the pulp. With the death of the pulp there is death of the whole of the *crown* of the tooth; the enamel and dentin are left absolutely without sensation or nutritive function. Whatever change comes to the crown of the pulpless tooth is of a distinctively disintegrating, retrograde character, tending directly to undermine its integrity. The disintegration will be rapid or gradual in proportion to the character of the individual tooth. The crown of a first permanent molar which erupts at six years of age, if devitalized at eight to twelve, will lose its cohesive strength, become fragile, and seem to melt away under the adverse conditions to which it is ordinarily subjected in the mouth in very limited time, while a thoroughly calcified tooth devitalized as to its crown at or near maturity will generally complete its normal period of usefulness without visible evidence of the important loss the tooth has sustained. These phenomena are so well recognized that a statement of them might seem trite but for the bearing they have upon other and less familiar facts and observations.

While with the death of the pulp there is complete cessation of vital function in the crown, the vitality of the *root,* except in its

dentin, is not interrupted or lessened. The cementum, with its membrane, is the most important tissue for the conservation of the tooth; hence the peculiar emphasis attaching to the fact that the cementum receives its nutrition and life from a source independent of and practically unaffected by devitalization of the pulp. Articulation with the alveolus also, that most important of the tooth's relations, remains unaltered, and there are substantial reasons for assuming that the functions of absorption and nutrition are not interfered with. Pulp endowment, in so far as it affects healthful union between root and alveolus, might be dispensed with without detriment after the tooth is fully erupted.

It is in place at this point to allude to that practice (possibly "fashion," "craze," or "fad" would better express its meaning) which holds so lightly the virgin alveolo-dental articulation that it breaks it up at pleasure; in other words, it extracts, mutilates, and replants apparently without consideration or reason, and with no regard to the fact that this all-important relation once disturbed is never certainly restored. Such practice may attract attention and possibly gain fleeting notoriety, but it is wholly at variance with the laws governing nutrition as exhibited in other parts of the osseous system. Extraction, we believe, destroys the life of the cementum and the pericementum. Excision of the root, and more especially denuding it of cementum, deprives the root of the only tissue through which restoration to a vital, nutritive union with the alveolus is possible.

A replanted tooth may, for a time, present the appearance of having resumed its normal relations, but it is a matter wholly undemonstrated that the pericemental membrane, when once its connection with the alveolus has been broken by extraction, ever resumes its true function,—that of nutrition of the cementum. Replantation under the most favorable conditions, as, quick replacement of single-rooted occluding teeth, with no disturbance to root or membrane, is but an experiment in any case, and is frequently, if not usually, followed by beginning absorption of the root within a brief period. The period of usefulness for such a tooth is bounded by months rather than years, so that if the end sought is permanent restoration to usefulness the object is not often attained. "Extraction," "excision," "treatment out of the mouth," "replacement," may sound to the ear as of a dento-surgical operation of magnitude

and importance, but the procedure is believed to be unjustifiable from any surgical standpoint or from any good results yet born of it, it being physiologically incompatible with the office of the tissues involved. And if this be said of *replanting* under favoring conditions, what shall be said of the modern operation of *transplanting,* that process which selects months-old, dried specimens to plant in artificially prepared cavities in the jaw? Can any preparation of such a root, as shaping, polishing, filling, or disinfecting, restore to its dead cementum or pericementum the life which shall reunite it in a living union with osseous tissue in which it may be implanted? As well might we look expecting to see the fulfillment of Ezekiel's vision in the valley of dry bones, or that wonderful prophecy of a young professor in one of our dental colleges whose raptured vision beheld teeth shaped from animal ivory, and even porcelain, planted in openings made vacant through extraction, as that the dried cementum on the root of an extracted tooth shall ever be revivified and renourished through the instrumentality of pericemental action. One of two results must follow the operation of replanting or transplanting a tooth: either there will be renewal of the nutritive function in cementum and pericementum, or there will be elimination of the tissues of the root through absorption or suppurative displacement. Living tissue abhors dead matter, and cannot be induced into permanent association, much less vital union, with it. The reunion between the implanted portion of the tooth and the jaw which for a time seems to take place is more apparent than real; the discolored gum-tissue and the retarded circulation reveal that the union is more mechanical than vital.

But to return to a more careful study of the root portion of an undisturbed pulpless tooth. *It* is a vital, living organ, retaining and exercising function as when the pulp distributed sensation and nutrition to the dentin and enamel. Engorgement of pulp-tissue resulting from a recent devitalizing application may, and frequently does, produce hyperemia of the pericementum, but the resulting irritation quickly subsides on removal of the devitalized pulp. There are no necessary untoward cemental or pericemental symptoms,—neither change in the office work of these tissues following the removal of the pulp,—hence this operation, accompanied with proper disinfection of the tubules and of the intertubular matter,

necessarily implies uninterrupted normal function of the tissues which furnish vital attachment between root and alveolus.

Pulpless teeth when properly treated are wholly comfortable; not weather indicators, not erratically subject to periodontitis, alveolar abscess, and other pathological conditions, but teeth with a favorable prognosis in all essential particulars.

Pulpless young teeth, that is, teeth which have lost their pulps before the vascularity of the cementum has been restricted by the contraction of its lacunæ and canaliculi through deposits in its substance, are far more subject to cemental accretions, or so-called exostosis, than the same teeth with living pulps. This is by no means an unfavorable condition, as through it the territory of normal circulation is increased to the benefit of the tooth.

A noticeably frequent result of pulp-destruction is a closer, firmer union of root and alveolus. This is probably due to two causes: first, an increased tendency to a deposit of cemental tissue on the surface of the root, and, second, the entire obliteration of calcific deposit through pulp influence. A pulpless tooth which has never been the subject of pyorrhea alveolaris, the author, from careful observation, believes to be practically, if not entirely, exempt from that trouble; and devitalization and removal of the pulp in the beginning of the disease in individual instances is attended with the most satisfactory results.

The value of a pulpless tooth should not be estimated from the condition of the natural crown, as *it,* with present methods for permanent crown restoration, is the least important part of the tooth. The *root*—the living part—and its surroundings, that upon which the permanent comfort and retention of the tooth depend, should always form the basis of judgment and a diagnosis. If the root portion of the tooth is firmly in vital union with the alveolus, and without pyorrheatic tendencies, the condition of the crown, whether much decayed or broken, or whether wholly gone, is not a matter affecting the possibilities of restoration in the smallest degree. A crown having the appearance of the natural tooth, and practically indestructible, can be supplied on any good root, and on many very badly broken ones, in any part of the mouth. That root which has an uninjured pericemental connection never questions as to whether the crown it is supporting is natural or artificial, but performs all the functions of a tooth with uncomplaining fidelity.

It is generally easier and more satisfactory, because of facility of access, to deal with a root or roots devoid of crown than with a tooth having a crown susceptible of contour restoration by means of a so-called filling. We conclude, then, that the pulpless tooth, with or without a crown, is a living organ of the economy, and to be treated as such. It may be removed or extracted when obviously demanded for cause, but *never for treatment.* Special care is demanded in its treatment not to pierce or otherwise injure the cementum or its membrane; to thoroughly remove all pulp decomposition, and disinfect the tubular and intertubular matter. To accomplish this there may and should be rather free removal of the dentin from the thicker portions of the root, care being exercised not to trench upon the cementum and to leave the apical third practically undisturbed. The one root-dressing and disinfectant than which nothing else is demanded, as nothing acts so well, is pure wood creasote. If it is proper to speak of specifics among remedies, creasote is a specific as a root-dressing, acting to promote harmonious relations between the devitalized dentin and the living cementum. It may be tightly impacted on raw cotton and sealed in a root from which an aseptic pulp has been removed, but never so applied in a septic root.

Removal of so much of the dentin as may be determined upon, enough at least to gain free access to the root-canal, and thorough cleansing of the root from all septic matter, should be followed first by instrumental applications of the creasote in the canal, and this in a few hours by a few fibers of saturated cotton placed loosely in the canal; and this again by cotton more closely packed, until the creasote and cotton can be tightly sealed in the root. When the cotton withdrawn from the sealed root has the odor of the creasote only, it may be permanently sealed with filling-material, or with a post in cement, with perfect assurance of future comfort.

Successful treatment of a tooth having a septic pulp, accompanied with tendency to pericemental trouble, requires judgment, tact, and experience, which no details in a written article can impart. This one point may be emphasized to great advantage,—viz, no root should be sealed with a permanent filling without first testing it with a cotton and creasote dressing, and not until the creasote permanently overcomes all other odors is the root ready for filling.

It has yet to be fully comprehended that "*methods*" of filling, as

well as filling-materials themselves, are wholly subordinate to preparatory treatment of the root; and that that treatment is best which best promotes healthful nutrition of the cementum, remembering that whatever assistance may have been imparted through pulp influence from the living dentin is now withdrawn. Hence the effort should be to hold the devitalized dentin forming the body of the root in harmonious relation to the life of the cementum. And this object is much more certainly accomplished with creasote than with any other remedy.

It is not the purpose of this paper to discuss root-filling materials nor their methods of use; neither crowns, nor methods of crowning; but it is wholly in place after an experience of some fifteen years in the use of amalgam for setting the Bonwill crown to raise a voice of warning against the use of amalgam in roots, either as a filling-material or for the setting of posts. This latter operation can be done with greater facility and with equal security in the use of the non-irritating oxyphosphates, themselves reliable root-fillings and of adequate strength for securing posts. The oxychlorids are perfect root-stoppings, and to be preferred above all others in pulpless teeth retaining the natural crown.

Reference has been made to the fact that a crown having the appearance of the *natural organ* can be securely applied to *any* root having the alveolo-dental articulation in a normal physiological condition. Emphasis should be given this statement, and an energetic and most emphatic protest raised against the increasing use, both in crown- and bridge-work, of the disfiguring gold crown. Perhaps nothing cheapens dentistry more or more justly subjects it to jest and ridicule than the present unseemly and wholly unnecessary display of gold in and on the teeth. Gold crowns are admissible only on the roots of molars, where they are not exposed in ordinary movements of the mouth. Incisors, cuspids, bicuspids upper and lower, and upper first molars can be readily crowned with a band and post, so constructed that the porcelain tooth only shall be exposed, while all strain of mastication and occlusion is thrown upon the gold, which is entirely concealed. For first and second individual lower molar roots there is nothing comparable to an all-porcelain crown, of a construction which permits of fitting and setting the posts independent of the porcelain, on the principle of the Bonwill crown. Such crowns carefully adjusted and set in

oxyphosphate, or, better, a mixture* of oxyphosphate and a good amalgam, form a tooth which for durability and esthetic appearance leaves nothing to be desired.

We are thus led to the inevitable conclusion that the pulpless tooth is a living organ, maintaining, when properly treated, the same vital relations with the alveolus as when it carried a living pulp; that it is susceptible of perfect esthetic restoration, and that for comfortable retention, utility, and durability its prognosis is most favorable.

---

*The mixture of cement and amalgam above referred to forms a practically new cement. My attention was first called to the valuable properties of this cement by Dr. L. C. Taylor; afterward I had the pleasure of seeing it elaborately demonstrated by Dr. Clinton W. Strang. It is produced by first preparing a mix of amalgam as for filling, and following this immediately by mixing a good cement as for same. While the amalgam and cement are still in working condition, they are incorporated by mixing together in about equal parts. The resultant compound takes much more the nature of the cement than the amalgam. The color is sparingly improved, but the adhesive properties are greatly increased in the new cement. It attaches itself very tenaciously to dry dentin, and stands the wear of mastication much better than any plain cement. This mixture of cement and amalgam is valuable in many cases in practice, and should be more generally known.

SECTION VI.

Physiology and Etiology.

*The Physiological Relation of the Dental Pulp to the Economy.**

PAPER BY CHARLES L. HUNGERFORD, OF THE SECTION.

THE age is one of analysis; it is to be hoped that the future will be one of synthesis. The deductive method of analysis must of necessity be faulty, since few men would have the assurance to believe that they were acquainted with all the facts tending toward any given result; therefore, if we can approximate the Platonic method, commencing with generalities, it is possible that we may arrive at more accurate conclusions. I have therefore sought to bring a few generalities into this question which to some may seem to have no bearing on the subject, yet if a part partakes of the nature of the whole, will, I hope, not be deemed entirely irrelevant.

It is my desire to show that originally the dental pulp was a constructive organ, temporarily associated with the economy for the purpose of forming dentin, which has no such association; its function completed, nature tries to pass it on into other forms, for in nature there is no such thing as standing still. This constant pulsating energy in its various forms is either constructive or destructive, producing growth or decay; when there is decay there is a giving to other forms, or a resolving back into the great storehouse of nature. There is no disassociating these two great aspects

*Presented by Section VI, but read and discussed at this place.

of the life force of the universe; the moment growth ceases decay commences, which is the evolvement of more perfect forms.

If I can show this to be true it will be good presumptive evidence that the destruction of the dental pulp will be always permissible whenever it stands in the way of any operation to supply lost teeth, or to preserve or beautify those that remain.

While I believe in the absolute interdependence of everything in the universe, I do not believe that this dependence is restricted to eternally doing the same thing, which would mean an end to all progress and an eternal stagnation.

Every entity, cell, organ, or plant serves its place in the great economy. Like stones wedged within a wall, they bear down as much as they bear up; and as no man has yet succeeded in lifting himself off the earth by pulling on his boot-straps, so no evolution is complete that does not work with outstretched hands, one grasping something lower, the other holding on to something higher and more advanced than itself; it dare not let go of either or it would lose its place in that chain which can have no gap or missing link, and which is the only basis of a rational evolution.

"As above so below," said the thrice wise Hermes, and man, the epitome of the universe, proves the truth of the axiom. With every meal that we eat we are schooling ten million times ten million cells to a better performance of their functions; with every grouping of these cells into glands and organs there is a synthetic effort upon the part of these cells to become conscious entities in the conscious universe that they momentarily inhabit,—man's body; their life work done in any particular locality, they pass on to more perfect forms in other bodies.

The universality of this proposition holds good, whether applied to the animal, vegetable, or mineral kingdoms, but it becomes especially apparent in the functioning of the various tissues in man's body; they give up their form, which is their life, that he may live, —a trite truth, but seemingly of little profit in this day.

I do not propose to go into the so-called histology and physiology of tooth-structure, for what avails it to carry "coals to Newcastle?" You are all better acquainted with this subject than I, but if I can show that the carbonizing process does not commence at Newcastle, nor will it end there, it may prevent some more timid brother from hastening that other carbonizing process within the body

of human dentin while vainly imagining he is doing quite the reverse.

I would like to have cited the remarks of Dr. E. C. Briggs before the New York Institute of Stomatology, as reported in last month's *International Dental Journal,* they so thoroughly accord with my own views on this subject; but I know how easy it is to be influenced by great names, and how few are scholarly enough to hold decision in reserve until by personal experience and observation they can even commence to judge of the worth or expediency of any operation.

If we pause to think of it, there is a great similarity between the birth of a world, a man, or a tooth; force and substance being the universal father and mother of all that is, each has its three kingdoms separate and distinct from each other, though one in their origin and purpose. As soon as differentiation begins functionings change; thus we see while a tooth is distinctly a dermal product, it is differentiation of that derma that gives rise to the three membranes that produce enamel, dentin, and cement, each of which grows at the expense of the organ from which it derived its origin, and maintains its existence independently of that organ in exact ratio to that organ's maintaining or losing its original functions.

The entire enamel-membrane is used up by the forming enamel, the dentin still connected by that silver thread that waxes less with each succeeding year; the dentin itself serving no other purpose than a go-between, supporting the enamel shield on the outside and connecting it to the more vital cement underneath, but physiologically wholly independent of either.

Just as the soul in man stands midway between the body and spirit, the mediator and support of both, an entity whose placenta is lost in the womb of time, so that other placenta connecting the dentin with the body is striving to return to its parent source, and he best conserves the economy of nature who puts the fewest obstructions in her way when her hour has come.

Cut off the crown of the tooth, bore out the dentin to the very apex, that mere animal body, the cement, still lives and thrives as well, yes, better, than it did before, for that force that prolonged an existence, its life work done, has now gone to strengthen an active functioning tissue; I mean the periosteum. Indeed, so much is this the case that among skillful dentists the first procedure in

treating a bad case of pyorrhea is the destruction of the pulps of the teeth involved.

With our present knowledge there never was, never will be, but one successful argument against pulp removal, and that is our inability to entirely remove it and fill the space. I have heard many objections to this operation, but this is the only one that seems to me to be of any force.

I have heard it said that nature knows what she is about, and if she did not want a tooth-pulp she would never have made one. Nature is a fine scapegoat upon whom to cast the results of our folly or our ignorance. Nature has nothing to do with it. A blind force following the behests of man, her master, whether he builds well or ill, consciously or unconsciously, nature takes no account of our ignorance or our wisdom, she bows only to commands.

A few there are whose mental furnishings consist of what Dr. So and So says, but they do not count. Out on the professional man who accepts unreservedly the opinions of others! Let us keep our own individuality and think for ourselves, though we do it in spite of that syndicate called public opinion.

For myself, I am looking for the truth, and stand ready to renounce all I have ever heard or thought when facts stare me in the face; and these three facts appeal to me as the result of some years of experience: First, that a human tooth does not depend for its physiological relationship with the economy on either the dentin or the enamel, for neither comes in contact with that economy; and after the removal of the dentin, enamel, and pulp there is no impairment of the functions of the remaining dental tissues,—viz, cement, periosteum, and alveolar process; whereas if these tissues were interdependent in the same way as the glandular system, the destruction of one would mean the impairment of all.

The blood-supply to the vascular and pulmonary systems is a fair illustration of this principle; even true bone is not seriously impaired by the destruction of its medullary arteries and nerves.

Second, that the dental follicle having grown enough dentin to give stability, has performed all the physiological function of which it is capable, for any further functioning of the remains of this follicle after the typal limits of the dentin are reached is of an abnormal character, as shown by microscopic examination of

secondary dentin, pulp-nodules, etc.; and such further functioning is followed by disintegration and pain.

It therefore follows that the physiological relationship of the adult dental pulp to the economy is solely for its own maintenance, and that organ, tissue, or man who lives solely for himself has completed his life's work, loses his place in the evolutionary chain, and nature spews him out of her mouth.

Third, I have never heard the destruction of the dental pulp decried by any one who could successfully perform the operation. I have also noted that dentists or physicians who resort to chemicals to accomplish surgical procedures succeed in deluding no one but themselves. Like the other class who, believing that complicated nomenclature is *prima facie* evidence of a liberal profession, and that protracted college terms can take the place of brains, will find out in the end that they have filled up a profession they should protect and love with a set of nincompoops, whose only contribution to the great needs of humanity has been their college fees; for few really able fellows will care to spend years in garnishing a liberal education, the *sine qua non* of a professional man, with the trappings of any specialty.

It is with much difficulty that I have succeeded in padding my epigram beyond the limits of a paragraph, but if I have not completely hidden it in the chaff you may burn the chaff, providing you are willing to make of it a torch for the truth.

DISCUSSION.

Dr. Rhein: I feel that I but echo the sentiment of the gentlemen present in expressing the pleasure especially derived from listening to the last paper. The time has come when it is necessary in objecting to the views advanced by the authors of the papers read this morning in reference to the benefits that are frequently obtained by removing the pulps in mature teeth; the time has come, I say, when it is necessary to give some argument beyond that of saying that we are interfering with the ways of nature, and that we are taking upon ourselves a superhuman task when we claim that we can improve upon the methods of nature. It pleases me greatly to listen to the able manner in which Dr. Hungerford closed his paper, in replying to this well-worn argument which is no argument, and which does not meet the point.

Another point in reference to this subject, and a very pertinent one, is the following: It seems that just as soon as a member of the profession attempts to decry the evils that have resulted from the vain effort to save diseased pulps in adult teeth, and to speak against the ruthless loss of teeth throughout the world in this unsuccessful endeavor to save an organ that has fulfilled its usefulness, that man is at once planted in a position that he does not occupy. Because he has endeavored to show to the profession that there are many instances where such pulps should be removed, he is at once traduced as a man who removes the pulps of all teeth which come under his hands. A careful perusal of the dental magazines during the past year on this subject will tend to illustrate how misleadingly this form of argument has been raised against the wise discrimination of removing pulps that have been exposed in mature teeth. Gentlemen, this is no manner in which to meet a scientific argument in behalf of the removal of pulps in mature teeth that have become useless, either through exposure or through disease of their substance.

Another point to which I wish to call attention for one moment is the fact that some of the most recent and valuable histological work done by Dr. Fletcher, of Cincinnati, has illustrated to us the fact that the pericemental alveolar membrane is not possessed of the great amount of capillary circulation with which we have credited it, but, on the contrary, that a great many of the supposed capillaries have been found to be arterial, showing a disposition on the part of this much-abused nature to take a far better care of the subsequent nutritional supply of this most important portion of the tooth's permanent subsistence than we have hitherto given it credit for. The application of this recent result of Dr. Fletcher's investigation has a most important bearing upon this subject of the conservation of the most important part of the dental establishment, the membrane that connects the cementum with the alveolar process.

Dr. Black: It is not my wish to follow through the different points that have been brought out by the papers, but I do want to emphasize some things and call your attention to some failures in our comprehension of this subject. We do not yet know all about any of these subjects, and it is well to go somewhat carefully in the discussion of them. Perhaps I can say what I wish to say better in the form of statements; and yet you will understand that

making such statements offhand, without previous preparation, is always more or less dangerous and liable to erroneous wording.

First, I wish to call your attention to the fact that the peridental membrane has not received close, careful study as to its histological character by very many persons, and the nature of this membrane in many respects is not yet very generally understood; and I may say is not well understood by any one. There are points in regard to this membrane that I feel I do not yet understand, although I have given it a great amount of study. This must be remembered in the discussion of any points with reference to this membrane. For instance, I may refer to the set of glands that occupy this membrane, close against the cementum, and say that I am not satisfied that I know all about those glands, and the profession generally seem to ignore the presence of these glands. The cementum itself is not generally very well understood.

I wish to make this statement: The cementum is practically a continuous growing body. It is thin on the teeth of the young, thick on the teeth of the old. It is a body that is very liable, as we all know, to extraordinary growth, becoming very thick, being subject to excementosis, and this may occur at almost any age; generally it occurs after adult life.

The method of detaching and reattaching the peridental membrane to the tooth is not very generally understood. This is very clearly set forth in careful histological examinations of many teeth, if the subject is well studied. This detaching and reattaching, either from the alveolar wall or from the cementum, which occurs every time the tooth is moved considerably, is done by absorption of the fibers, cutting them away, and then the fibers are reattached by laying down new cementum or new bone.

Dr. D. D. Smith: Are you talking of the root or the alveolar structure? Is it the root, the cemental structure, that is absorbed?

Dr. Black: Not the cemental structure necessarily, but the fibers that are attached to the cemental structure may be cut off by absorption from the alveolar process, and reattached in the one case by the laying down of additional cementum, and in the other case by the laying down of additional bone.

Dr. D. D. Smith: Which is it?

Dr. Black: To the root of the tooth it is cementum; to the alveolar wall it is bone that attaches the fibers.

DR. D. D. SMITH: Inasmuch as we have to move teeth so frequently, I think it is important that we know that fact.

DR. BLACK: I think so, too, and that is just the reason I bring it up. We are moving teeth frequently, and it is important that we know what takes place.

DR. D. D. SMITH: Will you as a scientist please tell us whether that absorption takes place from the alveolar socket, or does it take place from the cementum of the root?

DR. BLACK: It may take place from either.

DR. D. D. SMITH: From which is it most likely to take place?

DR. BLACK: The absorption of calcified tissue is very generally from the alveolar process. It may be from cementum, or even dentin. Now, this is the mode of detaching and reattaching. In replanting teeth the mode is not changed. Every replanted tooth that is reattached, properly speaking, is reattached by the laying down of new cementum upon the old cementum, and the fibers are attached in that new cementum. Now, if that could be perfectly done, so as to restore the physiological condition, if we could have our conditions so perfect that new cementum could be laid perfectly on all parts of the root, we should have a perfect reattachment and a perfect restoration; but, unfortunately, I have never seen a case where it was perfect; and where it is imperfect and the irritation still remains there is generally absorption, and this absorption generally prevails and the tooth is lost. Now, I say, if we could have perfect conditions we could have perfect results, but unfortunately we are not able as yet to obtain perfect conditions.

I agree wholly with what has been expressed here as to the complete death of the dentin on the removal of the pulp of the tooth, and that the tooth may be very perfectly retained in health and vigor of use after the removal of the pulp. This removal of the pulp is justified in very many instances. But is the tooth as good as if the pulp remained alive and healthy? Surgery is in one sense always an interference with nature; in another sense not an interference with nature, but an interference with the progress of disease. Is that tooth as good as if the pulp was alive and healthy? I want to say no, emphatically. In a great mass of cases the only course open to us is to destroy the pulp, but the later in life it is done the better for the tooth. In every case where a tooth-pulp is destroyed, retrogressive changes begin in the dentin. In every case

there is some molecular change. I make this statement from this fact that has come out distinctly in the experimental work which I have done: I have found no tooth in which the pulp had been dead for ten years in which the dentin was up to its normal strength. There is a retrograde process. I do not know what it is. I cannot explain it. There is this other fact: Wherever, on account of recession of the pulp with clear calcification, which cuts off the dentinal fibrils, destroying of course the nourishment of that portion of the dentin, in cases of wear, where those dentinal fibrils are open to the secretions of the mouth we have also a retrograde metamorphosis of that part of the dentin, and it loses its strength, even if the pulp remains alive. Now, there are different degrees of this loss of strength, and these different degrees of loss of strength are very important. While I do not think there is anything like life remaining in the dentin after the death of the pulp, there is osmosis of material through the dentin that influences its integrity. If the dentinal tubes are open, so that there will be abnormal osmosis into and out of the dentin from the saliva, we will have retrograde processes going on with increased activity; and if it is not open to the fluids of the mouth, the character of the osmotic action between the peridental membrane from the cementum and through the dentin will be of such a character as to tend to the preservation of the integrity of the dentin, and the tooth will remain brighter and its strength will be less impaired than it otherwise would. Every time we allow saliva to enter a cavity from which the tooth-pulp has been removed we injure the integrity of that tooth. And I am not certain but that we often injure the integrity of the dentin by destroying the physiological character of the osmotic action and the osmotic fluids that circulate through the dentin, by some of the remedies that we stuff into the tooth.

I would say this in closing: Whenever a case presents itself in which you should devitalize the pulp of a tooth,—if you devitalize by means of arsenic, or if you devitalize mechanically after cocain, or what not,—never under any circumstances allow anything to enter that cavity except that which you yourself design to put there. Then seal it so as to absolutely prevent absorption from the saliva, and your tooth will have the best opportunity to remain strong. It will not discolor, it will maintain its integrity for the longest possible period.

Do not destroy the pulps of the permanent teeth of children. The apical foramen is large, and you will not get so perfect an operation as you will for adults. Another element that many of you do not think of is this: If you destroy the pulp of a tooth for a person who is forty years old, a good long life will only require forty years more of endurance for that tooth. If you destroy the pulp of a tooth for a child, say sixteen years old, you have to add all of these years to the endurance that you wish for that tooth; and let me tell you, gentlemen, it does not stand up to the work.

Now, those of you who in the past have followed these cases with records to which you could quickly refer, and determine just when and how these things were done, or those of you who will do so in the future, will find that what I tell you is true. These teeth from which the pulps are removed during childhood do not stand through a good long life. They break down simply from deterioration.

THE PRESIDENT: The Chair is obliged to limit the essayists to five minutes each in closing the discussion.

DR. D. D. SMITH: I regret, Mr. President, that in the five minutes allotted me I cannot discuss the paper read by Dr. Black; neither satisfactorily reply to his remarks upon the paper of this morning. But a few words as to the thickness of the cementum at different periods of life: He tells you that it gets thicker on the roots of teeth with advancing age. This may be in accord with laboratory investigations, but it is not in accord with clinical experience; and where these conflict I am disposed to favor clinical experience as being more trustworthy. The cementum on an old tooth with a living pulp is not as pronounced as in that of a tooth in young life. That is the reason why the roots of teeth become exposed from absorption of the alveolus as age advances. On the roots of teeth which have loosened through pyorrhea or absorption, it is difficult to distinguish the cementum from the dentin. The young tooth, on the contrary, has a strong vital attachment to the alveolus, which, if the pulp be destroyed, it generally retains through life, the pericementum commonly bringing an increase in the form of exostosis, thus favoring a more perfect union of the root with the alveolus. The most important factor for service in a tooth is the keeping of the cementum of the root in healthy union with the alveolus. While I do not at all advocate the destruction of pulps in young teeth, I

yet believe that you do not necessarily injure the root of the tooth in removing the pulp. You do injure the *crown,* as was suggested in the paper, and that always to a degree, whether it is a young tooth or an old tooth. This, however, is of small moment, as we have the living part of the tooth still intact, and with our present methods any crown can be restored and made serviceable on living roots. If the dead dentin in a root is placed in harmonious relation with the cementum, that tooth will stand, and it will never question whether the crown it carries was made in your laboratory or in the laboratory of nature.

As to the laying down of cementum on extracted roots, the paper under discussion says that no such process ever occurs; that where the root is implanted in a jaw there is a mechanical union analogous to the throwing out of tissue for the uniting of bones. There may be an effort on the part of nature sometimes to re-establish the tooth in the jaw, but it is always abortive. Dead matter is never revivified, and dead cementum is no exception. True cementum is not deposited on the root of a tooth which has been severed from its pericemental connections.

It has been said that no devitalized tooth is ever as good as one with a living pulp. This is stating but half a truth. Notwithstanding our prejudices and misconceptions, in many instances a devitalized tooth is just as good in every way as the same tooth with a living pulp; sometimes, as has been stated in papers here, it is even better. Now, we are not advocating the devitalization of teeth without a purpose; but there are conditions when a live pulp in a tooth is an injury to that tooth, and if we only had the foresight and the courage to get rid of it the tooth could be made useful for a longer period. What if the *crown* is injured, as we know it often is, by devitalization? It is of small importance whether a slow process of disintegration or discoloration begins in a devitalized crown. The *crown* is not the *tooth.* It is very easy of demonstration that dentin properly treated will not discolor appreciably in any tooth. Dr. Black has, for the second time on the floor of this Association, made the statement that one of the very bad things to do is to allow the *saliva* to come in contact with the pulp-cavity. I have seldom heard a more indefensible statement. To suggest that the fluid into which the tooth is born, and in which it continues through the period of its natural existence, is fraught

with so much mischief to the tooth, causing its discoloration and disintegration, seems to me too incongruous to be worthy of discussion.

Dr. Hungerford: I do not know that I have anything further to say. I am very much pleased indeed with the complimentary remarks of my friends Dr. Rhein and Dr. Black. I am especially pleased to see that I have the universal support of this entire Association in the very radical statements that I have made. I cannot help feeling that, if silence gives consent, the members of this entire Association either lack the courage of their convictions or else believe that the destruction of the dental pulp is the proper thing to do when it stands in the way of any operation they desire to perform.

I can but deprecate the idea of setting up straw men to knock them down. "If thine eye offend thee, pluck it out. It is better that thou go through life maimed than that thy whole body should be cast into hell fire." That is the sum and substance of my argument. I have nothing further to say. I said all my say in that paper, and I am glad that this Association is so much in accord with me.

SECTION V.—Continued.

Recent Advances in Therapeutics.

PAPER BY A. W. HARLAN, OF THE SECTION.

WHILE there is great activity in every department of dental science and practice, there is no one department where greater or more rapid strides are being made than in therapeutics. All of our ingenuity and skill may be spent in the so-called practical direction, but the application of remedies for the cure of disease is also a part of handicraft, and it keeps pace with the march of progress. Much of the learning and knowledge of drugs is first acquired in the bacteriological laboratory, but more of it is acquired in the empirical use of drugs on man and animals. Such is the restlessness of this age that we are not content to await the slow methods of experimentation, but we must use all new agencies in those fields where better methods are needed, or where we expect quick results. Hence it is that we oftentimes know that a drug will, when applied to an abnormal condition, external or internal, produce certain results without being able to ascertain or explain its exact mode of action. When we do know, it seems so simple that we wonder we did not discover it before. Take the action of trichloracetic acid, for instance, when it is applied to a concretion on the root of a tooth; at first it permeates it, corrodes it, destroys the animal matter which holds it together by attracting the lime or other inorganic matter; then it burns, chars, and incinerates the mass until it crumbles and loses its attachment for the root. The action is both chemical and destructive, and the root is freed of its deposits.

Uric Acid.—In a consideration of the etiology of the so-called

pyorrhea alveolaris, many authors have contended that the concretions on the roots of the teeth have their principal origin in the excess of uric acid to be found in the human organism. In a recent paper called "Uric Acid Theories" A. C. Croftan, M.D., of Pasadena, Cal., says, "We maintain:

"1. That uric acid is not the *materies morbi* in uric acid lesions.

"2. That uric acid acts pathologically only from its tendency to form concretions.

"3. That its formation, far from being a process of auto-intoxication, is a process of disintoxication.

"4. That the decrease in the excretion of uric acid observed in some morbid conditions is not due to retention, but to non-formation.

"5. That the *materia peccans* in uric acid lesions are the alloxuric bases.

"6. That in all so-called uric acid lesions we find an absolute increase over the normal of the sum of uric acid and alloxuric bases, and that this finding is of diagnostic value.

"That uric acid is a non-toxic substance has already been emphasized; it is furthermore almost insoluble in the tissue juices,—its salts are essentially insoluble. Not so the alloxuric bases; they are readily soluble, and possess highly toxic properties.

"Therapeutics: The hereditary taint exists; the general rules that empiricism has taught us as to mode of life stand with only those limitations that we must impose on all deductions we draw from empiricism. But in the fully-developed condition in lithemia, gravel, the onset of gout, we have measures at our disposal that counteract; we can exercise an intelligent prophylaxis and possibly effect a cure in many instances if we will follow the rational precepts that a recognition of the above theories dictates. Two indications obtain, a reduction in nuclein-katabolism and a raising of the processes of oxygenation.

"To attain the first object everything should be avoided that will produce a leucocytosis,—viz, a number of drugs should never be administered . . . and certain articles of diet that we know produce leucocytosis, notably proteids, should be reduced. Nuclein-containing foods, such as internal organs, yolk of egg, are bad. Overeating is bad. Let it suffice to outline these points. In a true uric acid case there will be excessive nuclein-katabolism, despite

all we may be able to do, in the very nature of the taint, and restrictions in diet will not be of any permanent benefit; the chief point of attack will be in the direction of raising oxidation, and it is here that I have had the good results that I previously mentioned. A uric case should be treated as an anemic case in all measures employed to promote the oxygenation powers of the blood,—*i.e.*, the production of an increase in the red blood-corpuscles and all the hemoglobin and its chief oxygen carrier, iron. I administer iron in the forms and on the same rational principles that I would administer it to a chlorotic patient; arsenic is usually combined with it.

"I need not mention the many medical measures at our disposal to attain the above goal, nor the hygienic measures that will promote aëration of the blood; neither is this the place to critically discuss the merits or demerits of alkalies, salicylates, etc., and their efficiency as solvents and eliminators of poisonous products. The most striking results have been obtained in acute cases by inhalations of oxygen gas. On six occasions I did 'cut' an attack of gout by giving the patient inhalations of oxygen repeated at short intervals. I can invariably relieve, if not cure, a uric acid headache, a migraine, in short, lithemic attacks, by oxygen inhalations. The benefits derived from the procedure are surprising and most gratifying, and the relief to the patient almost instantaneous. What oxygen will do in uremia, which in my view is due to alloxuric base poisoning, not to uric acid poisoning, I have not been able to try as yet. I have a record to-day of only twenty-two cases in which results were so positive that they merit chronicling. My clinical facilities are limited, and it is for that reason and in order to know as soon as possible whether the principles I advocate, when more widely applied, will merit universal acceptance I request my patient readers to send me short reports of cases on whom they may consider it worth while to try oxygen inhalations. It would be a boon, indeed, to humanity if in so simple procedures as are advised a cure could be found for one of the most widespread scourges of over-civilization."

Liquid Air.—So many articles have appeared on liquid air in the popular magazines that we are not surprised to find that the *Medical Record* of July 22 has such an article from the pen of A. C. White, M.D., from the surgical standpoint. I will quote from this paper

on the efficacy of liquid air in the treatment of ulcers, for the opening of abscesses, and as a local anesthetic. (Professor Chas. E. Tripler, of New York, has for some time been able to furnish liquid air for popular use, and is now supplying it in small quantities to members of the medical profession. Its temperature is 312° F. below zero. No special precautions are to be taken in its transportation, as it may be carried in a tin can placed within another can lined with felt.) "In using liquid air as a local anesthetic, I believe it better to apply it intermittently while the operator is working than to try to freeze the part so that it will remain senseless for any length of time. This intermittent use of the spray would not be necessary when a simple incision was required, as in the case of opening an abscess.

"I first began the use of liquid air in the local treatment of ulcers of the leg, chiefly varicose, many chancroids, and some specific ulcers. So many of these cases have now been treated with liquid air that it can be said with positiveness that we have nothing at our disposal to-day which will so quickly, thoroughly, and with so little pain clear up the edges and stimulate the surface of an ulcer to granulations as liquid air does when properly applied. The application should not be made so frequently as to break down the new granulations as they form. After the first two applications to a varicose ulcer, one application a week is usually sufficient. To a chancroid or mixed sore one application pretty generously applied is sufficient. A 'beefsteak' chancre requires two or three applications three or four days apart. All ulcerations treated with liquid air seem to do better when followed by a dry dressing, such as aristol, subgallate of bismuth, or stearate of zinc, instead of any unguent.

"An abscess, boil, carbuncle, or bubo in the early stage is aborted absolutely with one thorough freezing. If it is more advanced, several applications at intervals of twenty-four hours are necessary. Whenever pus has formed in large quantity it is advisable to anesthetize with liquid air, incise, and evacuate. In cases of bubo and carbuncle well advanced, it is unnecessary to curette if the liquid air is applied generously to the base of the abscess after incision. In all these cases the pain is instantly relieved after the application of liquid air. No sloughing follows excepting in the case of fairly well advanced carbuncles, and in some of the abscesses when the overlying skin has become devitalized from tension and

inflammation. In these cases the slough is only superficial, and the ulcer left readily heals.

"In a number of cases of sciatica and of herpes zoster, one case of intercostal neuralgia, and one of facial neuralgia, liquid air has been tried. In every one of these cases instant and, so far as we are able to judge at the present time, permanent relief has been obtained by applying the liquid to the spinal end of the affected nerve. In one case of sciatica the air was applied to several points in the course of the nerve. In two cases of herpes zoster (all were situated on the chest wall) the eruption had completely dried up three days after application, and in the other cases about five days were required. In none of these nerve cases was the air applied more than once, and in no case was the application severe enough to cause blistering or sloughing.

"Two cases of facial erysipelas were treated; not with a spray or swab, on account of the extent of surface involved, but by rolling a glass bulb filled with liquid air over the tissues involved. The surface temperature, the inflammation, and pain subsided at once; but it was impossible to get any subsequent history of the cases, so that the result of the single treatment is doubtful. I should imagine it would require a number of applications at intervals of several hours to accomplish much good in erysipelas."

Papain.—The concentrated active principle of the juice of the unripe fruit of Carica papaya. The juice is concentrated in vacuo, and the ferment is precipitated by the addition of alcohol. Papain forms an amorphous, white, hygroscopic powder, soluble in water and glycerol only. Employed as a digestive ferment, like animal ferments (pepsin), it digests albuminous substances, possessing the advantage of being active in either acid, alkaline, or neutral solutions. Dose, 0.12-0.5 gram (2-8 gr.) after meals. Applied as a five per cent. solution (in equal parts of glycerol and water), it is used to dissolve the false membranes of croup and diphtheria, and it has been used to digest portions of a pulp. This requires from twenty-four to seventy-two hours in most cases. The cavity must be sealed well.

Orthoform.—$C_6H_3(OH)\ (NH_2)COOCH_3$.

Synonym: Methyl-para-amido-meta-oxybenzoate.

Occurs as a white, voluminous, odorless, and tasteless powder. It is permanent and non-hygroscopic, and slightly soluble in water.

Used as an antiseptic and local anesthetic to relieve the pain of wounds, ulcers, burns, excoriations, etc. Being absolutely non-toxic, it may be applied to large surfaces in any quantity; as ointment it is used to the extent of ten to twenty per cent. made up with lanolin. Dose, 0.5-1.0 gram (8-15 gr.) in affections of the gastric mucous membranes. Orthoform hydrochlorid forms a soluble crystalline salt, and, although it anesthetizes as well as orthoform, it is not generally applicable for subcutaneous injection. (D. R. P. Hoechst.)

Orthoform, New.—Under the name of the new orthoform (orthoform new) the Hoechst Color Works has put on the market meta-amido-para-oxybenzoic-methyl ester, while the original orthoform is para-amido-meta-oxybenzoic-methyl ester. The new preparation is whiter and cheaper than the original article. It is used in the same way as the original orthoform. It is perfectly non-irritating, even when applied in full strength.

Silver Sulfo-Carbolate.—Synonym: Silver sulfo-phenate. An antiseptic used like itrol and argonin, in eye-diseases and wounds. It occurs in white, prismatic needles, containing twenty-eight per cent. of silver. Prepared from silver carbonate and sulfo-carbolic acid. The preparation must be protected from the light and air, otherwise it is liable to split up into metallic silver and phenol. It is said to possess good antiseptic properties, and to be preferable to silver nitrate, owing to its non-corrosive action. It acts very well in deep pyorrhea pockets; it is soluble in water in three to ten per cent. solutions.

Actol.—$AgC_3H_5O_3$-H_2O. (Silver lactate.)

A white, inodorous, and tasteless powder, soluble in water (1 : 20), recommended as a surgical antiseptic. An aqueous solution (1 : 100) destroys within five minutes all pathogenic microbes. As a hypodermic injection in erysipelas, 0.3 gram to 100 cc. of water; as a wash, a teaspoonful of the solution (1 : 50) to a glass of water. I have used silver lactate in suppurating pockets on the sides of roots of teeth with excellent results. It will stain the cementum, but these stains are as easily removed as those from silver nitrate. It does not cause pain when used up to twenty per cent.

SECTION V.—Continued.

Counter-Irritation.

PAPER BY W. E. GRISWOLD, OF THE SECTION.

ONE principle of homeopathy applied in allopathy, "Like cures like," or counter-irritation, is defined as a superficial and artificially produced inflammation, in order to exercise a good effect upon some adjacent part or deep-seated morbid process. As applied in our specialty, it generally consists in the application to the mucous membrane of rubefacients, which are mainly useful in the early stage of the acute or chronic form of inflammation. Their action is to relieve tension in the blood-vessels by dilating the capillaries and diverting the blood current from the inflamed area; also causing reflex contraction of the blood-vessels, thus diminishing the supply. They should be applied at a point more or less remote, lest the congestion be increased rather than diminished, unless used to promote reabsorption of inflammatory products.

This is a therapeutic measure as old as the art of medicine itself, and it has stood the test of time and trial far better than most of its contemporaries, for the scientific tendencies of modern medicine have served to discredit many of them; but these same tests, when applied to counter-irritation, have only tended to confirm the good opinion empirically earned for it by demonstrating a scientific and rational explanation for its efficiency.

As there is only a certain amount of blood in the body, the determination or deflection of an unusual proportion of it to a certain part or to the surface of the body must necessarily reduce the amount elsewhere in the tissues. In this way a pneumonitis may be

favorably influenced by dry heat or poultices applied to the surface, or by a hot mustard bath to the extremities.

Acute internal inflammations have been treated this way for ages, and it cannot be denied that such treatment has been beneficial in its effects, both in its modification of the inflammatory process and in the relief of pain and distress. But there is another and far more important factor in the *modus operandi* of effective counter-irritation. I allude to the influence brought to bear through the nervous system. It is now known that certain sensations, painful or not, are carried along certain nerves, and that the sensitive point may be at a distance from the point where the irritation or inflammation is seated. Sometimes this painful sensation is carried from an organ in which it originated to the brain or spinal cord, and there transmitted along other sensory nerves to a part that is quite remote. This is illustrated by the right shoulder pain of certain diseases of the liver, and the left arm pain of angina pectoris; it is also shown in the intercommunication of nervous impressions from the uterus to the breasts in women, and by all the alterations in nutrition which may occur in one part through a profound effect made on a remote one, as in the ulcerations of the intestines that follow extensive burns on the surface of the abdomen. Perhaps the most clearly marked example of what is known as generalization of symptoms from a local focus of irritation in the mouth is that presented by a child in convulsions from painful dentition. Symptoms quite as well marked and as clearly traceable to irritation in the oral cavity may often be found in adults, though the connection may not, on the face of things, be so apparent, and much careful investigation is often necessary to establish the relation of cause and effect.

Instances of this kind may be presented by impacted third molars, congested pulps, forming abscesses, and the train of the reflected and referred pains that go with these conditions; even a condition of more or less profound nervous exhaustion or hysteria may originate in the same manner.

The idea I would convey is this: That this system of medication would be more effective in our hands if its reflex action was more carefully looked into and medicaments applied along the lines of transmission of pain, or remote parts, and by so doing get a reflex action in the other direction with relief of symptoms.

In the relief of congestion in the mouth a counter-irritant may be

applied to the mucous membrane or behind the ear, the nape of the neck, to the feet, or over the whole surface of the body, as indicated. Thus the range of remedies may extend from the use of a plaster or lotion on the gums to a mustard foot-bath or a hot body-bath, which may be brought to bear on the large superficial surfaces; and it is a question in my mind whether such systemic medication as cathartics, diaphoretics, diuretics, etc., might not be considered counter-irritants, inasmuch as they tend to the same result,—relief of congestion in remote parts.

SECTION VI.

Physiology and Etiology.

REPORT BY J. D. PATTERSON, CHAIRMAN.

IN giving a review of that part of science which embraces the etiology and physiology of disorders which interest the dental practitioner, we call attention chiefly to observations and investigations upon these topics which have been made since our last report.

Sachs, of Germany, speaking of the etiology of conditions in children, says that the rigor seen in the adult is shown in the child as a convulsion. In the first few days of life, convulsions in children are due to meningeal hemorrhage from protracted labor; later in life the most common source of convulsion is found in reflex origin. At the head of these peripheral irritations he places dentition, then follows with adherent prepuce, nasal obstructions, etcetera. The oral surgeon should be able to diagnosticate and point out the convulsions originating in the oral cavity, or eliminate them from convulsions due to organic disease of the brain, the onset of infectious disease, organic or inorganic poisons, rachitis, etc. He says that "while convulsions are not inherited *per se*, yet there is an inherited susceptibility of the nervous system to the various nerve disturbances."

B. Littlepage, M.D., of Kentucky, in *Alkaloidal Clinic*, April, 1899, describes a case in which a four-year-old boy lost all of his upper teeth, the alveolar process, and the lip. A sore first appeared

between the central incisors about the size of a pea. It enlarged rapidly, and ended in the destruction cited, and soon death ensued. The etiology of the case is described as follows: "In the absence of other etiological factors, and the presence of a diarrhea which continued for several weeks, we are forced to look upon the case as one of malnutrition from the diarrhea, with the failure of the vitality of the tissue of the lips."

We notice a review of the etiology of irregularities of the teeth by J. F. Colyer, M.R.C.S., L.D.S., *Dominion Dental Journal*, June, 1899. The following deductions are of interest as new, or at least not widely known: "The balance of facts seems to point to a distinct connection between irregularities of the teeth and modern civilization," meaning by this that the admixture of races in modern times or modern modes of living produce the principal factor in irregularity. As to the etiology, he argues that these effects are produced "in the maxilla partly through the arterial system. The brain and osseous structures of the face derive their main blood-supply from the same source,—viz, the common carotid. The strain of modern education, the character of amusements, indeed the whole environment of the individual, entails a greater call upon the brain than the more primitive mode of living in days gone by, and this necessitates a larger supply of nutritive material to that structure. This increased supply is probably provided at the expense of the osseous structures, including the teeth, with the result that these structures degenerate."

Wm. Hunter, M.D., F.R.C.P., read a paper before the Odontological Society of Great Britain upon "The Relations of Dental Diseases to General Diseases." He says, "The subject is one of very great practical importance, greater perhaps to the physician than to the dental surgeon, and is, I venture to think, not so fully recognized as it ought to be." He gives great praise to Dr. Miller for his paper entitled "The Mouth as a Source of Infection," read before the International Congress of Hygiene in 1897. Dr. Hunter dwells largely upon the relation of infective diseases to dental disorders. He says that dental caries and suppurations connected therewith "present the most complete examples of mixed infection that we find in the body." He cites suppuration of lymph-glands of the neck, cellulitis of neck, post-pharyngeal abscess, thrombosis of veins, tubercular glands, general pyemia, and meningitis, and says

their occurrence is frequently from dental infection. He describes a case in his own practice of subacute infective gastritis, secondary to suppuration around decayed teeth, where a complete cure followed the removal of four stumps of teeth around which pus had long been oozing. He brings the charge against physicians that *"the custom to disregard dental diseases altogether as a factor in etiology and pathology is as unjust to the patient as it is discreditable to the physician."* Your Chairman congratulates the profession that one so high in authority has so pointedly noticed what we have so long endeavored to correct,—viz, the alarming and unexplainable tendency with the great majority of physicians to refuse to recognize dental disorders as a salient factor in general disorders. He claims also that the pathogenic organisms from dental disease often "become *permanently established in the stomach,"* and that "subacute and chronic catarrh, so often met with in association with suppurative dental disease, may be not merely the result of irritation set up by fermentation of food-products, but the result of *definite invasion* of the mucosa and sub-mucosa. Under such circumstances it is possible to conceive that the effect might not stop short at catarrh, but lead to subacute inflammatory changes, resulting as all such changes do,—viz, in atrophy of glandular cells and increase of fibrous tissue." These statements of Dr. Hunter certainly commend themselves to every dental and medical pathologist.

W. Knowsly Sibley, M.D., M.R.C.P., of London, writes of "Neurotic Ulcers of the Mouth," citing cases where other causes were eliminated, and even after all teeth were removed the ulcers continued. In his opinion mental troubles were the cause of the ulcers, and, from his experience, they may commence at a time of unusual strain and disappear when the worry is removed.

Dr. W. Huebner, Germany, discourses upon the "Possibility of Wound Infection from the Mouth, and its Prevention by Means of a Face Mask During Operations." He says that it is a well-known fact that the human mouth forms a true breeding ground for all kinds of pathogenic and non-pathogenic micro-organisms. He refers to Fluegge, who showed that spores containing liquids in the form of the finest drops conceivable might be carried over a considerable distance by small currents of air. He also demonstrated the important fact that speaking, coughing, and sneezing cause such fine droplets to be carried from the mouth and nose to a distance of

several meters. This means of infection he declares to be of greater importance than that of air. Dental surgeons and general surgeons who take all admirable precautions to perform antiseptic operations by sterilizing the persons of operator and patient, instruments, dressings, and the atmosphere, should carefully heed the warning of Dr. Huebner, and see that the mouths of patients and operators be sterilized as scrupulously as the instrument which penetrates the tissue. A lesson also is taught the dental operator who, in the usual operative procedures, fails to be sure that his own oral cavity contains no bacteria which may be conveyed to the patient.

James Tyson, M.D., Philadelphia, writes upon the topic, "The Uric Acid Diathesis from a Clinical Standpoint." Dr. Tyson is esteemed one of the foremost medical authorities upon gout and kindred diseases, and your Chairman deems that it is competent to note the fact that, while dental writers have formed volumes of literature claiming that in the uric acid diathesis is found the initial for pyorrhea alveolaris, yet medical authorities who are best known as authority upon these troubles regularly fail to give pyorrhea as one of the diagnostic symptoms of the uric acid diathesis. Copious reference is made to interstitial nephritis, dark-hued urine, depression of spirits, irritability, biliousness, constipation, urates, migraine, nausea, high tension in blood-currents, endarteritis, sclerosis, vertigo, etc., but not a mention is made of pyorrhea alveolaris.

Dr. Tyson in this article puts the following pointed question and answer: "Does the uric acid diathesis produce sore-throat, bronchitis, and asthma? So far as these conditions are associated with the requirements of the gouty diathesis, it may. But there is no proof of it except that derived from analogical reasoning. It is *prima facie* unlikely." Your Chairman suggests that the likelihood of the uric acid diathesis producing destructive disease in the mucous membrane and other tissue investing the teeth is a yet more unwarranted statement.

From the "Year Book of Medicine," 1899, we make the following extracts: "The Influence of the Soil on Dental Caries." C. Röse, Germany, has examined the teeth of twenty thousand recruits, and has noted the influence of drinking water upon them. The harder the water, the richer the soil in lime and magnesia, the freer were the teeth from caries.

The doctrine of Metschnikoff in regard to "Phagocytosis" is being

ably defended as ever by the school of the Pasteur Institute, while its opponents in Germany and Russia are no less able and earnest. The mode of destruction of bacteria in the body is dwelt upon. Catacuzene believes that the phagocytes are the only destructive agents of bacteria in the body, both in active and passive immunity. If phagocytic activity is suspended, as, for instance, by subjecting the animal to narcosis, the animal dies. That the leucocytes are the seat of the bactericidal substance is proved, he says, by the fact that the phenomena of Pfeiffer cannot be seen under the skin unless leucocytes are in contact with the serum. Lanvier objects to the use of the term "phagocytes," since leucocytes have other functions than phagocytosis, and functions that are of greater value to the organism. In inflammation, for instance, he sees in the breaking up of the emigrated leucocytes a mechanism by which the actively proliferating tissue-cells are provided with the copious supply of nutrition which they require.

Geo. W. Cook, D.D.S., of Illinois, presents investigations pointing out that the root-canals of diseased teeth might possibly be a source of tubercular infection of the cervical and neighboring lymphatic glands. This in supposed non-tubercular patients.

Dr. J. W. Peck, Chicago, in a paper read before the Kansas State Dental Association, 1899, entitled "The Etiology of Nerve-Cries," especially deals in the diagnosis of neuralgias not readily traceable to a direct cause, such as a condition of the nerve itself and its immediate surroundings, old adhesions, changes in the peri-neurilemma resulting from chronic rheumatism, pressure from cicatrices and new growths, as in syphilis, where periosteal nodes about canals cause pressure upon nerve-trunks; imperfect tissue metabolism, diabetes, neurasthenia, uric acid, etc. Dr. Peck has given an admirable review of the whole subject, especially upon dental lines.

Dr. C. S. Beck, in *Dental Cosmos*, discusses in favor of the theory that dental caries is accompanied by inflammation. He says, "We know that the pulp is abundantly supplied with blood-vessels and nerves. Now, if the line of demarkation found in the teeth affected by caries be the product of a deposit of lime-salts in the canaliculi, how and by what means are these salts carried there unless through inflammatory action?"

A partial list of additional articles published since our last report, dealing with the subjects of this Section, is as follows:

"A Uric Acid Diathesis the Chief Factor in Pyorrhea Alveolaris," by Edward C. Kirk, D.D.S., *International Dental Journal.*

"Pyorrhea Alveolaris," by Meyer L. Rhein, M.D., D.D.S., *Dental Review.*

"The Physiological and Pathological Condition of the Nerves Relative to Dentistry," by G. C. Marlow, D.D.S., Wisconsin, *Dental Review.*

"Degeneracy in its Relation to Deformities of the Teeth and Jaws, and Irregularities of the Teeth," by E. S. Talbot, M.D., D.D.S.

"Temperament as Indicated by the Teeth," by C. H. Nicholson, D.D.S., New York, *Dental Digest.*

"Erosion," by Leonard Strange, D.D.S., Indiana.

"Reflex Disorders of Dental Origin," by H. H. Burchard, M.D., D.D.S., Pennsylvania.

"Do the Pulps of Teeth ever Unite with the Tissues from which They have been Separated?" by A. H. Fuller, M.D., D.D.S., Missouri, *Dental Review.*

"The Modifying Influences of Vitality in Dental Caries," by S. Blair Luckie, D.D.S., Pennsylvania, *Dental Cosmos.*

In submitting this report, your Chairman desires to say that no claim is made that it embraces a notice of all the valuable material upon etiology and physiology which has appeared during the past year, but embraces only that which has come to your Chairman's notice.

In conclusion, the Section announces that the following papers have been secured, and have been deemed especially worthy of a hearing before the main body:

"The Physiological Relation of the Tooth-Pulp to the Economy," by Chas. L. Hungerford, D.D.S., of Kansas City, Mo.

"The Etiology of Gnathic Abnormalities," by Alton H. Thompson, D.D.S., Topeka, Kansas.

SECTION VI.—Continued.

The Etiology of Gnathic Abnormalities.

PAPER BY ALTON H. THOMPSON, OF THE SECTION.

THE degeneracy of the jaws of civilized man as compared with those of the apes, or even with the lower races of mankind, is one of the most conspicuous of the special features of his organization. The recession and reduction of the jaws seems to have kept pace in an inverse ratio with the development of the brain and the consequent enlargement of the brain-case. The facial skeleton is really embryonic in civilized man, for the jaws develop but little in the evolution of the individual from infancy to maturity, but remain at a stage that is attained in childhood. Observers have noted that there is a striking resemblance between the face and jaws of an infant ape and an infant man; but in the ape the jaws develop extensively as the individual grows to the adult form, while in man they remain at a stage that is more or less embryonic through adult life. That the jaws of civilized man are much reduced from their size and strength in the apes, and even the lower races of mankind, is a well-known fact that has been dwelt upon by many writers. Dr. Talbot made extensive observations to demonstrate that the really normal human jaw is growing gradually smaller. But the gradual and normal diminution of the jaws does not, according to Dr. Talbot, constitute degeneracy in its strictest sense, but that the word is applied to abnormalities in size and form. He says ("Degeneracy," p. 248), "When arrest of development so takes place that deformities of the dental arch result, the jaws vary much, and (253) in no part is degeneracy so evident as in the stigmata of the jaws. . . . The jaws as a whole, owing to an

unstable and ill-balanced nervous system, are liable to become excessively developed as well as arrested in development." The jaw parts are the subject of various deformities, which are not to be ascribed to mere accident of either intra or extra uterine evolution. The causes must be sought for farther back in that nerve-trophism which presides over the nutritial supply, which is the prime source of physical and mental defects, abnormalities, and monstrosities. There is no doubt that some of the causes of simple contracted jaws and consequent irregularities of the teeth are prenatal, although much of dental irregularity is also due, of course, to inharmony of the jaws and teeth during the eruption of the latter.

If the causes and evolution of normal life are obscure, how much more obscure are the causes of abnormal organisms and parts. In our search for light let us begin at the beginning and note some of the facts in regard to the evolution of the facial parts in vertebrates: From the vertebral column proper two arches spring, comprising the axial skeleton. First the smaller is placed above the vertebral column, and is called the neural arch, because it incloses and protects the nervous system, the brain, and spinal cord. The second is the larger arch and lies below the vertebral column, and is called the visceral arch, because it incloses the viscera. The trunk and head of a vertebrate are composed of segments serially arranged, and these arches are correspondingly found in the head, the cranium being distinctly composed of vertebral arches; the comparative size of the arches being reversed, however, as in man. The bones of the brain-case therefore belong to the neural arches, and the facial skeleton to the visceral arches of the typical vertebrate. Professor Huxley says ("Anatomy of Vertebrates") "that the facial skeleton bears a distinct relation to the posterior visceral arches, and corresponds to the gill-arches of amphibians and fishes." Professor Flower says ("Osteology of the Mammalia"), "At a very early period in the lamina forming the side walls of the cervical region of the embryo certain thickenings appear, dipping downward. These are the visceral arches. Between them slit-like openings are found, which are called the visceral clefts. In the lower vertebrates some of these clefts remain open permanently, forming the branchial apertures of fishes and amphibians for breathing, the gills; but in the mammalia they speedily close, and, with the exception of the first, leave no trace of their existence." Or, as Professor Ernst

Haeckel says ("Evolution of Man," Vol. I, p. 355), "In the embryo of man, as in that of all other vertebrates, the gill-arches and openings appear at a very early period on each side of the head. . . . The gill-arches are transformed finally into the jaws, partly into the hyoid bones and the bonelets of the ear. . . . (Vol. II, p. 224), The first of the gill-arches becomes the jaw skeleton of the mouth. A small process first grows out from the base of the first gill-arch. This is the upper jaw process, a plug-shaped formation extending up to the neural processes and uniting with them. The next gill-arch develops a cartilage on its inner side, called, after its discoverer, 'Meckel's cartilage,' on the outer surface of which the lower jaw is formed. The upper jaw process forms the principal part of the entire framework of the upper jaw. The middle portion of the upper jaw skeleton, the intermaxillary bone, develops from the anterior portion of the frontal process. The palate roof, separating the mouth from the nasal cavity, is formed by the coalescence of the two lateral portions of the horizontal plates of the upper jaw processes. When these do not adhere in the middle line there occurs an opening between the two cavities, cleft palate, as it is called. Hare-lip is a slighter degree of this arrest of development." Neck slits are also survivals of the gill-clefts.

Now, the causes giving rise to imperfect development and abnormalities of the jaws must be sought for in the conditions surrounding the evolution of the jaws from the gill-arches, for these defects are more or less of reversions to primitive and early embryonic types, as found yet in living low water-breathing vertebrates, in which the gill-arches remain permanently. The prevailing influence in impelling the further evolution of the parts is growth force, *Kinetogenesis,* as Professor Cope calls it ("Factors of Evolution," p. 246), the effects of use and disuse. He classifies growth force into "excess of growth energy, defect of growth energy, degeneracy from disuse, degeneracy from excess of growth elsewhere," etc. The energy of growth from use tends to the development of an organ or part in anticipation of its use. This leads to the full and typical evolution of the jaws in response to the energy of their employment. Degeneracy and decrease of the jaws, as of other parts, results from the decrease of growth energy through disuse. This is manifested, of course, in the trophism of the nerves which preside over the nutritial supply during growth. In Darwin's

classic words ("Descent of Man," p. 12), "Disuse at that period of life when an organ is chiefly used (and this is generally during maturity) seems to have been the chief factor in causing organs to become rudimentary. . . . It causes a lessened flow of blood to the part, and thereby lessens normal and functional development. Continued disuse thus weakens and diminishes any part of the organism."

The teeth and jaws, but especially the jaws, have suffered extensively through disuse, and are in the condition of being rudimentary. When very defective and imperfect they are primitive and embryonic. Such parts are, according to the laws of evolution, generally very variable, for, not being normal, they are not regulated by the sustaining influences of natural selection. When a part becomes useless another principle, economy of growth, comes into play to avoid any unnecessary expenditure of vital material in the construction of a useless part. This has been well described by Mr. Darwin. It seems to follow as a logical result that, the jaw parts having become in a degree useless in man, nature should naturally withdraw the nutritial supply and thereby render these parts rudimentary and incomplete. Economy or growth force would diminish the blood-supply, nerve-trophism would diminish nutrition, and deformities would result through the variability of so weak a part and vagaries of development follow.

Another law must be considered also as applying with great force in regard to the jaws, and that is the law of correlated variation, or growth, on which Mr. Darwin lays great stress. Indeed, he says in regard to its effects upon the growth of the jaws ("Descent of Man," p. 33), "From the correlation which existed (at least in some cases) between the development of the jaws and the limbs it is possible that in those classes which do not labor much with their hands and feet the jaws would be reduced in size from that cause. That they are generally smaller in refined and civilized people than in hard-working men and savages is certain." That this law must obtain among people of luxurious and indolent habits there seems little doubt, and that it does have an effect upon the development of the jaws there is little reason to question. Persons who use their muscles but little cannot reasonably expect to transmit strong osseous organization of the extremities to their children, and by correlated variation the jaws are prone to be affected sympatheti-

cally. How far this law operates we can only conjecture, but that its effects should accumulate from generation to generation in the classes which do no manual labor seems reasonably conclusive. Perhaps the practice of athletics by the wealthy classes will tend to counteract this tendency and produce and transmit a better muscular and osseous organization, with a corresponding good effect upon the jaws, through the law of correlation.

In contemplating these and other well-known laws it seems highly probable—indeed, it is the opinion of leading evolutionists—that the higher races of man are now undergoing a rapid evolution. Radical alterations of structure are in progress, due to the efforts of nature to adapt the species to the rapidly changing environments with which civilized man is surrounding himself. He is producing for himself a new environment, and he alters it so frequently that nature is obliged to make strenuous efforts to alter his organization to keep pace with the changes in order to his preservation. How far these changes can be carried and how rapidly they can be effected is a serious question affecting the future of the species. Some of these variations are necessarily self-limiting, and will eventuate in the extinction of some types that have become so modified in some directions as to render further change impossible. When such varieties meet impossible conditions of environment, extinction is the only result, as has been amply demonstrated by the extinction of whole groups of highly specialized animals in past geological ages. The efforts of nature have already produced a very heterogeneous mass of varieties of mankind. Among European races some of these changes have had a pronounced effect upon the jaws, and will probably eventually produce varieties with still more embryonic jaws and larger brain-cases. The increase of the latter, stimulated as the brain is by high mental exercise, must be at the expense of the jaws and facial skeleton, which are not subject to use and stimulation. There is an inverse reaction here, and degeneracy of the jaws is undoubtedly contributed to by what Professor Cope calls "degeneracy from complementary excess of growth elsewhere." The skull and jaws by this inverse growth in civilized man are a wonderful example of the effects of use and disuse, which proceed simultaneously, illustrating the complementary growth relations of the parts. Professor Cope says (*op. cit.*, p. 248), "The orthognathism of the higher races is accompanied by full frontal

development and retardation of the post-embryonic growth of the face. But this change can be traced to use, increased brain-action enlarging that organ and expanding its osseous case, probably at the expense of lime-salts which would otherwise go to the jaws."

The jaws and face being therefore in this reduced condition through the effects of evolution, it is but a step to the production of deformities by the collapse of the nutritive powers through faulty nerve-trophism. These collapses of nutrition are the cause of asymmetry of the jaws and face, incomplete evolution of any of the parts producing distortions, and even the grosser growth defects, as cleft palate and hare-lip. In the latter we have an exhibition of the embryonic and primitive condition of the arches as found in early vertebrate aquatic life. As Dr. Harrison Allen once said (*Medical Times,* 1879), "Errors of development and growth force of the face often occur; not alone in the failure of the arches to unite, as in hare-lip and cleft palate, but processes not ending in gross defect, yet exercising just enough disturbing influence over the bones of the face to prevent success in shaping the oral and nasal cavities." Inasmuch as the normal face is the result of the perfect union of the lateral visceral half-arches joining the median structures projected from the front of the brain-case, it follows that if there is any want of harmony between the two genetic movements errors of symmetry and imperfections readily occur. An explanation may thus be given which reasonably accounts for the want of development of one or both halves of the dental arch. This maldevelopment is in the nature of a catastrophe, and beyond the effects due to growth suppression.

In regard to the growth defects of the upper face, it was said by Dr. Hubbard (*Dental Cosmos,* 1898, p. 270), "Some of the etiological factors have particular reference to the abnormal conditions also of the nose, naso-pharynx, and pharynx during the development of the jaws. These conditions exercise the most direct bearing in causing deformities of the upper and lower jaws." Their value may be estimated when we consider that ninety-five per cent. of skulls have deflection of the nasal septum. Dr. Harrison Allen said (*op. cit.*), "Many cases of dermoid cysts have been tabulated, the result, it is thought, of imperfect nutrition at certain points along the line of the visceral arches. Asymmetry of the nasal chambers, the external nose, and the two halves of the dental arch

often occurs entirely apart from the acquired defects in the same locality."

The jaw parts of civilized man being reduced so as to make an almost perpendicular line of the face, orthognathism, as it is called, are in marked contrast to the prognathism or protrusion of the jaws of the lower anthropoids. The inverse relationship of the jaws and cranium which has been referred to has much to do with this, of course,—*i.e.*, as the brain-case advances the jaws recede, and as the jaws advance the brain-case recedes; the balance between the animal and intellectual natures being graphically represented in the faces of the highest man and the lowest ape. The embryonic condition of the lower face of the higher races places it just on the verge where the least disturbance of nutrition throws it over into the region of imperfection and deformities. The contracted forms of the arch which we so often see associated with high intellectual development tell the tale only too plainly. The brain has very evidently been evolved at the expense of the face. Gross defects due to failure of the gill-arches to unite in the median line are directly due to collapse of growth force at the period when the embryo had not yet passed the gill-arch stage. Such individuals are generally degenerates in the most complete cases. The collapse may be a matter of accident perhaps, and yet nature does all things in accordance with positive laws. The law in regard to gnathic abnormalities seems to be that of degraded nerve-trophism consequent upon the incomplete evolution of the gill-arches to form the face, due in its turn to disuse and the inevitable economy of growth which follows disuse. Nature is exact in her accounts and inexorable in her demands, and when a part becomes practically useless the nutritive supply is withdrawn and needless expenditure avoided. This law is of universal application throughout the human organism, and many other defects of structure and deformities could be accounted for in accordance with its workings.

SECTION VII.

Anatomy, Pathology, and Surgery.

Report by W. C. BARRETT, Chairman.

SECTION VII has never failed each year to present to the Association quite as much matter as could well be considered during the limited time allotted to it. In truth, it has usually been necessary to exclude communications which, under other circumstances, might have been presented with profit. This year is no exception to the rule, and again we must ask for all the time that can possibly be allotted to us. It has not been the policy of the Chairman to extend a general invitation to all to prepare papers on subjects germane to the interests of the Section. He has rather selected the subjects to be considered, one for each of the branches of practice covered by the Section, and then has specially invited some one who is an accepted authority in that specialty to present a paper summing up the products of the latest thought and research. That plan has been pursued this year, and if its results are commensurate with those of preceding years, there will be no reason for changing the method of procedure.

There are many questions in practice which should be further discussed, and better comprehended by the average dentist. One of these relates to septic conditions. We frequently hear it asserted that if it were possible to keep the mouth completely sterilized there would be no decay of the teeth, and hence the destruction of all bacteria is a desirable object to be secured. The fungi are frequently spoken of as invariably agents of destruction. It should be comprehended that when they produce diseased conditions it is only incidentally. Without the agency of the fungi this earth could

not exist. It is their function to tear down that which has been built up, and to restore the elements to nature that they may be again used in the production of new organisms. Were it not for them, all organizable matter would in the course of time be locked up in organic structures that would bid defiance to time, as does inorganic matter. As soon as function ceases, the fungi decompose the organic body and return the atoms to earth, ready for the needs of another functional structure.

But animal bodies are continually undergoing tissue death in the elimination of that which has served its purposes, and the supplying of its place with new tissues. The fungi are active in the getting rid of this used-up matter, through its decomposition. It is only when they multiply in inordinate numbers that they become destructive to living tissue and organs.

Some of the micro-organisms seem necessary to proper animal function. They are important aids to digestion, and were it practicable wholly to eliminate them from the human system, it might not be possible for function long to continue. There are bacteria which materially assist in the preparation of our food for assimilation. Some of them have a very active peptonizing influence. The active ferment principle of the gastric juice, called pepsin, acts only in the presence of an acid, while some of the organic ferments, the bacteria, have a digestive action in a neutral, or even an alkaline medium. Without their aid function would be weakened, and hence complete sterilization of the human mouth and the digestive tract, even were it possible, would be undesirable. It is but the septic or poisonous organisms that are necessarily prejudicial to healthy function.

The capping of pulps in pathological conditions seems a much argued question. Some practitioners claim to cap dental pulps successfully, no matter what the circumstances may be. Anything short of entire putrefaction they assert may be restored in every instance. It would appear that such men must have peculiar ideas concerning function. Any pulp of which the patient is conscious is in a pathological condition and demands curative treatment. The functions of the dental pulp should be carried on without any subjective symptoms whatever, as should be digestion. The consciousness on the part of the individual that the stomach exists is proof positive that there is something abnormal. In perfect health

the dental pulp gives no sign of its existence, and when cold or heat causes a disagreeable shock, the pulp of that tooth is in an irritable condition and the patient should seek the dentist.

It may be that this shock is but momentary, soon passing away, and so the condition is neglected. It may arise from a denudation which the dentist will be unable entirely to remedy. But in any case, whatever it is possible to do should not be neglected. In its purely normal condition the dental pulp does not respond to external influences, and it may be cut and probed with impunity, so far as sensation goes. There is probably not one present who has not traumatically exposed a pulp without the knowledge of the patient, and without having caused any disagreeable sensation. But having done this, only a very short time elapses before that pulp becomes intensely responsive. Almost immediately it takes on pathological conditions, which change its whole subjective nature.

So long as the pulp of a tooth has sufficient resistant power almost immediately to recover from the irritant shock, so long as there is only irritation, with no special functional changes aside from this, there is no doubt that capping, if skillfully done, may always be successful. But the time may come when an active hyperemia supervenes. The vaso-motor nerves no longer exercise full control over the blood-vessels, and the latter undergo a functional change. There is diapedesis and infiltration of the pulp-tissue, and this exudation pressing upon the terminal nerve fibers causes a continuous pain, and this is the symptom of impending degeneration. The dental pulp, like an organ that presents some analogous features,—the brain,—is surrounded with unyielding bony walls, which, while its protection in health, become its dark prison house in disease. Nature would seem to have depended upon this fortress for protection in all conditions. So, like those of the brain, the blood-vessels are without some of the usual protecting coats. There is a practical absence of the lymphatics, and hence an effusion is not readily absorbed.

It follows, then, that in the case of a pulp in which diapedesis has occurred, and in the tissues of which the infiltrate exists, capping is contraindicated. The confining of the irritable and inflamed pulp within the artificially restored walls of the tooth will be an additional irritation, which in time must result in a further

effusion that will induce inevitable strangulation and stasis in the blood-channels, and that necessarily means death. The pathognomonic symptom, then, of such a condition of the dental pulp as makes capping injudicious, is the presence of continued pain; not necessarily uninterrupted, but pain that has existed for a continuous period of time, as contradistinguished from that which is but the momentary effect of a thermal shock. It is not sufficient that the disagreeable symptoms shall have been quieted, and temporarily quelled. The infiltration of the pulp must be relieved and the exudate removed before capping in these instances may be relied upon. Because of the special conditions existing in pulp-tissue, resorption of effusive products is a very slow and uncertain process, and hence pulp-capping, when there has existed any continuous pain, is too hazardous an undertaking to be appealed to save in exceptional instances.

The dental pulp usually gives warning of impending stasis by a reversal of symptoms. In irritable conditions there is but a momentary shock. With acute hyperemia and exudation there succeeds the continuous pain caused by the infiltrate, and in both these states cold is distinctly irritative and exacerbating. But when the blood-stream in the capillaries becomes stagnant, and nutritive currents are no longer carried to the nerves and tissues supplied by them, there is a complete reversal, and cold relieves the intense pain of the engorged tissues, while the warm water or air which had previously been so soothing is now intensely irritating to the tooth. This symptom is surely indicative of approaching complete stasis, and when it is observed the sooner the pulp is devitalized the better, while of course capping is out of the question.

The assertion is indisputable that pulp-capping is too much neglected. But it is equally as axiomatic that it is too frequently attempted in conditions in which success is impossible. The pathology of the dental pulp is not fully comprehended, and instead of this practice being reduced to a certainty, with a comprehension of when it is proper and when bad practice, it is with most dentists a mere matter of empiricism,—of experiment and trial. It was not until lately that our schools made an exhaustive study of the pathology of the dental pulp a part of their curriculum, and hence it is little wonder that the subject has not been fully comprehended by the average practitioner, who has pursued the rough tenor of

his way, fancying, and in dental meetings and journals reporting, happy results in pulp-capping, when his own description of the conditions in existence clearly indicates to the pathologist that the temporary immunity from pain and local disturbance must be due to the quietude of death, and that a corpse exists within the pulp-chamber, of which at some time there shall be a resurrection that shall burst the prison walls and leave havoc in its path.

The Section recommends the reading to the Association of paper by Dr. Jas. Truman, "Reflexes from the Lower Molars;" paper by Dr. T. W. Brophy, "The Radical Cure of Congenital Cleft Palate, with Exhibition of Patients;" paper by Dr. Thos. Fillebrown, "Surgical Treatment of Cleft Palate;" paper by Dr. M. H. Cryer, "Some New Points in the Anatomy of the Face and Jaws;" paper by Dr. G. V. I. Brown, "Some Oral Surgery Cases and the Lessons they Teach."

Dr. M. L. Rhein, who had been invited to present result of original investigations on the pathology of the alveolo-periosteal membrane, reported the progress of three months' work, and, as results were incomplete, he was requested by the Section to present a paper next year embodying results of investigations now in progress.

SECTION VII.—Continued.

The Radical Cure of Congenital Cleft Palate.

With exhibition of patients.

PAPER BY TRUMAN W. BROPHY, OF THE SECTION.

I DESIRE to call your attention to a few cases which I will briefly describe, and to exhibit a few of the patients upon whom I have operated for immediate closure of the hard palate in early infancy. I am but too well aware that the methods that I pursue are not generally practiced, and that they have been criticised by those who do not fully comprehend them. It is gratifying, however, to realize that many of our most distinguished surgeons, who formerly questioned my methods, are now most enthusiastic advocates of them.

The question of early operations has, with me, passed the experimental stage. I will confess that my first cases were undertaken with a great deal of hesitation. I knew that I was transgressing all the long-accepted rules of surgical procedure; but it seemed to me so reasonable that the patients should be able to undergo the necessary trial that I ventured.

We know that the struggle of birth is often more severe than is this. There are sometimes misplacements and replacements of cranial bones during this critical natural process, more radical than that of bringing into apposition the separate bones of the maxilla. It has been the observation of every obstetrician that the injuries which the child sustains during parturition produce little immediate or ultimate injurious results.

My experience in some hundreds of operations performed for the closure of cleft palate, at from ten days to three months of age, has more and more confirmed my opinion and justified the practice.

I believe in operating at as early a period as is practicable after birth. My reasons are as follows:

First. The surgical shock is less, for young children react better, provided there is sufficient vitality. All mental apprehension is eliminated, and we all know that alarm and dread are among the most powerful factors in producing shock. Besides, the nervous system of a young child is not well developed, and it is not therefore capable of receiving the same impressions that it would later in life.

Second. Before the bones are fully calcified they may be bent or moved without full fracture, and hence the injury is really less than it would be if calcification were more complete.

Third. If the muscles are very early brought into action they develop instead of atrophy, and hence a good velum is secured, with plenty of tissue; when if the operation is undertaken later in life, after the parts have shrunken through non-use, they can rarely be made to subserve the same purpose that organs which have developed through natural employment can be made to do. It is well known that muscular tissue is more perfectly developed through action. In instances of cleft palate none of the muscles of the velum can be normally employed when the parts are not united, and hence they remain in an immature condition through life, even when an artificial substitute is inserted. By operating at a very early age they are at once brought into use and their development is proportioned to that of other tissues.

Fourth. When the palatal processes of the maxillæ are united it will be observed that the development of the bones and alveolar processes of the upper jaw assume a form nearly or quite normal, and when the teeth are erupted that they will properly occlude with the lower ones, or nearly so. In my first case the breadth of the upper jaw was reduced about three-fourths of an inch, while the lower one was twice that measurement. It was predicted by my surgical friends that the upper jaw was so much narrower that it must always remain contracted, and that when the teeth were erupted the upper ones would probably be considerably within the arch of the lower ones. My answer was that later on probably it might be within the province of the dentist to correct that by orthodontial methods. Rather to my surprise as time went on the bones developed and the arch spread until, when the upper teeth

were erupted, they occupied nearly or quite the normal relation to the lower ones.

Fifth. Following early operations there is much less of deformity, for all the tissues, bony as well as soft, develop naturally and according to accepted types. When the operation is postponed for a few years it is very difficult to secure such results.

Sixth. When the operation is made during early infancy the parts are sufficiently advanced to give possibility for normal speech when the time comes for learning to articulate. If the operation is not made until faulty habits are acquired it is with difficulty that they can be completely overcome, even supposing that the muscular parts could be made sufficient.

I especially believe that it is highly important that the operation upon the palate should be made before that upon the lip. It is a great mistake to commence at the oral opening and partially close the only aperture through which a subsequent palate operation must be made. The surgeon needs all the space that can be secured, which is none too much in a young child. The lip operation is comparatively simple and trivial, and it can be performed at any time; but the palate operation is made much more difficult if prior to that the lip has been closed. In proof of this I bring before you several patients whose condition will I think convince you that my position and practice are correct.

The first patient I show you is one upon whom I operated when she was ten days old. In this case we had double hare-lip and a wide cleft of both hard and soft palates. The palate was closed throughout its entire length at one operation. The tissues have assumed a normal relation and form. The arch is sufficiently wide to serve every purpose, and the occlusion of the teeth is fairly good. You will notice that the occlusion of the upper with the lower teeth is not quite normal, but by employing means well known to dental practice these teeth can be forced a little farther out so as to properly occlude with the lower ones. The fissures of the lip extended into the nostrils; the intermaxillary bones and the central portion of the lip were rudimentary. The lip therefore was formed by utilizing the tissue lateral to the fissures. An improvement in its appearance is yet to be made by removing some of the integument and reflecting the mucous membrane upward, thus shortening the lip. The child is now nine years old.

The second patient I show you is a child three months old. I operated for closing of the hard palate in this case when the child was three weeks old. I exhibit a model of the parts as they were prior to the operation, and I ask you to observe that it was by no means an ordinary case. The opening is unusually wide and the amount of tissue present comparatively small. On examination of the patient you will see the hard palate is completely closed, the parts being in good apposition through the reduction of the arch. The opening through the lip gave good access to the parts, and the operation was performed with greater ease because of it. The lead plates and the silver sutures which were employed to hold the bones in contact are still in position. This little child is a brother of the little girl first exhibited. It is interesting to note in this connection that, of the six children born to the parents of these two, four of them were defective in this particular. The oldest one was healthy and no evidence of the deformity existed, even to the slightest degree. The second one was afflicted with double hare-lip and cleft palate; the third with hare-lip; the fourth with double hare-lip and cleft palate; the fifth was normal, and the sixth with single hare-lip and cleft palate.

The deformities in these children have confirmed my opinion that nearly all such cases have a hereditary origin, the paternal grandfather having been similarly afflicted. The methods of procedure in operating for the closure of cleft palate are described as follows:

Place the patient on the table with the face toward the light. Introduce the oral speculum and thoroughly remove the edges of the fissure. A mere scraping of the mucous membrane is not sufficient to enable us to bring about union which will be permanent and satisfactory. Trim the opposing edges of the bones as well; it will secure a sufficient exudate (so essential to a perfect union), and will make the operation a successful one in this respect at least. The knife will easily cut through the soft bone of the hard palate and the alveolar processes of young patients.

Then raise the cheek, and well back toward the posterior extremity of the hard palate, just back of the malar process, and high enough to escape all danger of not being above the palatal plate of the bone, insert a large braided silk suture, carrying it through the substance of the bone, so that it will come out at a corresponding position upon the opposite side.

The silk suture is more easily introduced by the needle than wire, but a silver wire suture should be substituted for it, and drawn through in its place. The wire should be about No. 19, and may be doubled in case the condition of the parts and the tension upon the tissues necessary to approximate them seem to require it. Nearer the front portion of the palate insert another wire, carrying it through the substance of the bone above the palatal plate, and out through the other side in a position corresponding to the place of entrance. Thus we shall have one wire passing over the palate in front of the malar process of the bone, and another behind it.

The next step is to make lead plates to fit the convexity of the buccal surface of the bones. Have them provided with eyeholes, through which are passed the protruded ends of the wire upon each side. Twist these together; that is, the right end of the anterior wire with the right end of the posterior wire, and the same on the left side. These form heavy tension sutures, and the parts once approximated cannot be separated.

If we are unable to close the fissure with these wires, if from lack of tissue or from firm resistance of the parts the strain is too great, there is a further step to be taken which will obviate these difficulties. After the cheek is well raised, divide the mucous membrane and bone through the malar process. Carry the knife in a horizontal direction, and when well inserted sweep the handle forward and backward. In this way a maximum amount of bone and a minimum amount of the mucous membrane is divided. This done on each side, the bone can very readily be moved toward the median line. The wire sutures passing through the lead buttons may now again be twisted, and the cleft of the hard palate be closed by approximation of the two sides. The incision in the mucous membrane in making the separation of bones is made as small as possible, as this membrane must serve to retain the bones in proximity, or to hold them nearly together.

If after the parts are approximated they are kept antiseptically clean, they will unite kindly and the palate will be restored, so that its full function will be performed. Separation of the bone is attended with little hemorrhage, and the parts do not usually cause more inconvenience to the patient than the ordinary operation of

lifting the hard palate according to the practice of Sir William Ferguson.

The germs of the teeth are sometimes disturbed, and I have occasionally found certain teeth imperfectly developed when erupted.

The palatal arch is contracted, but this will not be permanent, for, if the operation is performed early enough, when development is complete the teeth of the upper jaw occlude naturally with those of the lower jaw. It is a well-known fact that the alveolar processes develop with the teeth, and this appears to be a pronounced factor in the formation of the jaw and the guiding of the teeth into their proper position.

After the approximation of the edges in the manner I have described, the parts should be thoroughly dried, the edges of the cleft carefully examined, and if need be some fine sutures inserted here and there to insure perfect coaptation of the parts. The after-treatment is very simple, consisting solely in antiseptic cleanliness, nourishing the patient upon liquid food, the prevention of disturbance of the parts by the child, or of the introduction into the mouth of anything that might interfere with the sutures. Abrasions of the mucous membrane caused by the lead plates need not disturb the operator, for they are usually slight.

The plates are to be left in place from four to eight weeks, but the silk coaptation sutures should be removed about one week after the operation.

DISCUSSION.

Dr. Barrett: The discussion of such a paper as this cannot be carried on except by those who are particularly acquainted with the operation; that is, all can have an opinion, but all cannot speak knowingly upon it. Now, I claim to be able to speak understandingly, and I ask permission to say a very few words concerning it, opportunity for discussion being given after the examination of the patients.

If dentistry had never produced anything before in the world except this single operation for the radical cure of cleft palate, we might claim that it should be immortal; we might, with propriety, assert that it had already presented sufficient for the amelioration of the woes of human kind, and of those poor, afflicted creatures who are without the usual means of communication, to give it a high place among beneficent professions. That alone might entitle den-

tistry to challenge the admiration of the world. It may be that you will think I am an enthusiast upon this subject. I am enthusiastic. I should be ashamed of myself if I were not. There once stood upon this earth one of whom it was said that He anointed the eyes of the blind and they saw; and that great miracle has stood before the world from that time to this to challenge the worship, the admiration, the wonder of mankind. I claim that the age of miracles has not passed, and that the profession that can touch the lips of the dumb and make them speak partakes of the character of the spirit of Him who touched the eyes of the blind and made them see. It is restoring speech, it is giving back to the world those who by misfortune have been segregated from it. And there are many of these. The dumb who speak not intelligibly the praises of their Creator are more in number than are the blind who cannot see His works.

I believe that this operation is the very climax of all possible operations in the cases to which it is adapted. That limitation should always be borne in mind. It is not for every case, but in those to which it is appropriate I believe it to be the climax of everything which has ever been presented by that blessed handmaiden of applied science,—oral surgery.

I have been familiar with this operation from the very first. I saw that upon this patient. I have seen the operations upon many other patients. There are over five hundred cases in which it has been made, and every one of them, so far as I know, was a success. In but one case to my knowledge has the child died, and that was not directly because of the operation. When the first one was performed, with considerable of trepidation on the part of its originator, but with the real confidence inspired by the knowledge which he believed he had, because it was doing violence to all the teachings of surgery it required a great amount of moral or some other kind of courage, in the face of all the world, to operate upon a child ten days old. Had that infant died under the knife the operator would have been charged with its death. Perhaps he would have been guilty; I do not know. It was his first case of the kind. I have watched the development of that child from that day to this. I have been more or less familiar with it during its whole existence. After the operation I said, "Well, I think that will unite, but there is going to be a bad condition afterward."

"There cannot be anything so bad as cleft palate," said the operator. "Agreed," I answered, "but there will be a deformed face, a very narrow jaw;" for its width was reduced from an inch and a half to three-quarters of an inch. "Now," I said, "what is to become of the teeth, provided teeth ever develop? Of course, they will occlude away inside the arch, and there must be very much of deformity." But I was astounded when at a later date I saw the same patient with the deciduous teeth erupting as normally, with almost as complete occlusion, as ever occurs in any case that is uncomplicated with cleft palate. I do not know what is the mysterious process of nature which brings about that peculiar development of the jaw that makes the upper teeth exactly to occlude with the lower ones. Why does it not stop short? Why does it not overlap? In some cases it does, but only in abnormal development. In this instance there was a development from abnormality to the type of normality. You observe that the child speaks about as well as any child could.

In another case, in Kansas City, the attending circumstances were such that if I could relate them to this audience your manly sympathies would bring to your eyes the manly tears over the happy results. I saw that child a year since. It was a boy who had just graduated from a local school, and he delivered the valedictory address, and not a soul there dreamed there had ever been anything abnormal in the case.

Laying aside all personal considerations, and viewing these cases only from the humanitarian side, we have cause to feel a glowing pride in the benefits which our beloved profession is conferring on suffering humanity. Each of us has a share in the glory earned by our brother practitioner, Horace Wells, in conferring upon mankind the priceless boon of anesthesia. So it is a matter of exultation to every dentist that dentistry can so gloriously answer the ends of its existence.

As its Chairman, I was directed by Section VII to present this matter at this time, out of its order, because the little patients who are present could not be exhibited at any other time, and their trained nurse in whose charge they are must forthwith commence the journey back home.

The remaining portion of the Section will be presented in its due time, when we will have another paper to add, by Dr. Fillebrown,

which offers another phase of the subject, adapted to another class of these unfortunates, in which will be detailed more of the beneficent work of a profession which through its marvelous advancement is challenging the admiration of the world.

Dr. Brophy: Mr. President, I desire to express my appreciation to you and to the members of this body for extending to me the time, out of the regular order, in which to present my paper and exhibit these patients.

Dr. Cryer: I only wish to say a word now upon this subject, and then discuss it perhaps in the future. Dr. Barrett speaks of Dr. Brophy's operation as a miracle. I wish to say, in the first place, that I do not believe in past, present, or future miracles, but in the intelligence and ingenuity of man, who has discovered ways of correcting abnormal conditions of the human organism. Dr. Brophy has most certainly done this in an admirable way. Fortunately, I have a few lantern slides with me which can be used this evening while giving my illustrations on the anatomy of the face that will demonstrate, anatomically, why the jaw is not narrowed in this operation. They will show that the upper jaw is naturally much smaller than the lower jaw both in infancy and old age, and also that the alveolar process and teeth of the upper jaw flare outward as they pass downward, while this condition is reversed in the lower jaw. This is the cause of the overlapping of the lower teeth by the upper.

SECTION VII.—Continued.

Hare-Lip and Cleft Palate.

PAPER BY THOMAS FILLEBROWN, OF THE SECTION.

VERY little has been added to our knowledge of the cause, frequency, or description of hare-lip or cleft palate during the last generation, while within the last decade considerable progress has been made in the surgical treatment of these deformities.

The cause is universally conceded to be arrest of development, but as to what the cause of arrest of development is, opinions differ widely. As a matter of fact, it is very imperfectly understood, and seemingly must remain a matter of conjecture rather than demonstrated fact.

Mental impressions, shock, and heredity are the essential causes to which disturbance of development is attributed.

The fact that the fetus is fully developed either perfect or imperfect before the end of the tenth week, the lips being completed by the end of the seventh week, leaves but a small margin for mental effects. The absence of records of cases where any mental impression could be traced, and the frequency of cases where perfect children have been formed under circumstances when the mental impression must have been powerful for the wrong, raises a question as to the effectiveness of this as a cause.

A considerable number of deformed children have been born in successive generations of the same family, enough perhaps to lead to the conclusion that in individual families heredity may be considered established, but the number is relatively so small that this cannot be considered a potent factor in the generality of cases.

Shock is so frequently a cause of defect in development that it is

entirely reasonable to consider a hare-lip or cleft palate as one of the results.

To my mind what may be termed "accidental" is the most common cause. By accidental I mean one of the thousand incidents that may disturb the physiological action without the knowledge of the patient or attracting the attention of the observer. I mean the same causes that produce congenital club-feet or hands, an imperforate anus, an open foramen ovale, hernia, cataract, or other "morbi connati." This reasoning brings us back to the point from which we started: "We do not know."

The deformity may extend from the eye to the uvula, or it may include only a part of either portion, showing that the development may have been interfered with at any stage and afterward normal action resumed.

Records of maternity hospitals in Europe show that the frequency of this deformity is about one in eighteen hundred among the infants born there, but this cannot indicate the proportion to the population.

There are more clefts of the left side than of the right in the proportion of eight to five; of double cleft only a few. The deformity occurs more frequently in boys than in girls, in the proportion of seventeen to ten.

Until within a few years knowledge in regard to the value of the operation for cleft palate as a remedy for the defect had remained at a standstill, and no improvement in the methods of doing the operation had been made.

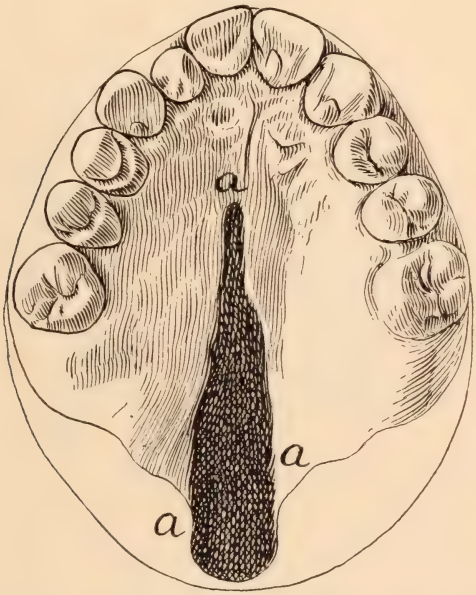
The profession had come to look on the surgical success as so uncertain, and the physiological results had proved so unsatisfactory, that all surgical proceedings had become discredited, and, save for practice, had fallen into disuse.

Lately there has been a revival of interest in the operation, and a growing faith that practical results may be obtained. I have sought to aid the matter according to my ability, and by combining ways and means known, with a little not before put on record, I have developed a method for operating which in my practice produces very uniform surgical success, and generally all the practical physiological results that could be desired follow. It makes articulation of all the sounds possible, and perfect enunciation attainable by intelligent practice and attention.

The accompanying figures make the plan clear. Fig. 1 shows

the mouth of a patient, male, seventeen years old. The fissure *a, a, a* extended from the uvula to opposite the first bicuspids. Fig. 2 shows the operation as I have performed it. I commenced my incisions at the edge of the fissure, Fig. 1, and with a hoe-shaped periosteum knife dissected off the tissue from the hard palate to the dotted lines *b, b,* Fig. 2. After paring the edges of the flaps I inserted silver sutures running above the flaps and passed them through the palate and through pure silver disks *d,* Fig. 2, twisting the ends and making tension which fully approximated the edges.

FIG. 1.



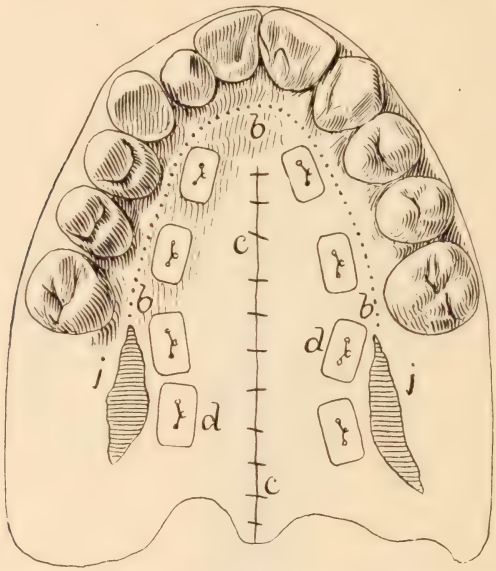
To fully relieve the strain upon the soft palate, and also to allow contraction of the arch, I made incisions *i,* Fig. 2, from the tuberosity down the side of the throat. In some cases I cut down to opposite the lower molar. I cut through the mucous membrane with a scalpel, and then separated the deeper tissues with a smooth dissector, in order to avoid injuring important vessels.

The edges of the cleft now held in close approximation, the mucous membranes were brought more accurately together by fine silk sutures, *c,* as shown in Fig. 2. I thus avoided the lateral incision in the hard palate, the cutting of the pillars of the fauces, and

approximated the tonsils so as to lessen the arch and allow the soft palate to retract to a considerable extent.

Should I find it necessary in any case to further widen the flaps at the junction of the hard and soft palates, I should make two or more button-hole incisions opposite the tuberosity. The button-holes will readily fill up by granulation. By this plan the extent of the incision is much reduced, the loss of blood lessened, and the nutrition of the parts preserved.

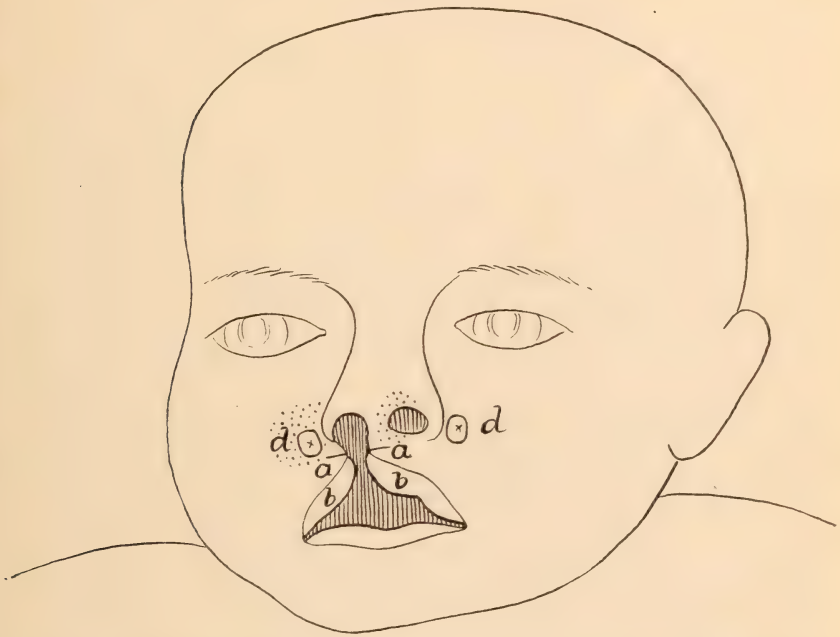
Fig. 2.



My apparatus for maintaining the anesthesia without interfering with the operation in the mouth I continue to use with great satisfaction. I described this in 1893 at the World's Columbian Congress. I have made considerable improvement in it since then. By its use no time is lost in waiting for anesthesia. It consists of a bellows, a wash-bottle containing ether, and a tube reaching to the mouth of the patient. Air is blown over the ether in the bottle, and becomes charged with the vapor and is discharged from a small tube into the mouth of the patient. I have adjusted a valve to the tubes entering the bottle by which the amount of air going over the ether is controlled, thus varying the strength of the anesthetic according to the needs of the patient.

Hare-lip is not so common as is cleft of the palate. A large proportion of clefts of the palate extend no farther forward than the cuspids, while the alveolus and lip are perfect. Such patients can much more easily acquire good speech. Good lip movement is as essential to perfect speech as is the palate, and when the lips are restricted by lack of substance or by cicatricial tissue, or fail by lack of use to perform their function, imperfect speech results.

Fig. 3.



The accompanying figure shows a system of incision that I have adopted which produces the most gratifying results as to length and width of lip. It utilizes all of the red border and wastes none, whereas the older plans sacrifice a large portion of it and render the lip narrow, and consequently the motion restricted.

Fig. 3 shows the lip of a patient, male, nine weeks old, for whom I operated a few months since.

There was also a complete fissure of the palate one-half inch wide, which I closed two weeks before I did the lip. As the septum was directed to the left, I separated that freely, as shown by the dotted

surface. I also passed the knife under the tissue on the right, freeing it from the bone nearly out to the infraorbital foramen. A wire passed through the tissue and through the disks *d, d,* and tightened, drew the parts into close apposition. This made the nostrils equal in size. I kept the right nostril packed for a few days to overcome the tendency to flatten, after which they remained symmetrical in all respects.

FIG. 4.

I pared the edges of the cleft down to the commencement of the red border, *b, b.* Then, to gain length to straighten the red border, I made the incisions *a, a,* at right angles to the edge of the commencement of the red border. I trimmed the upper sharp angle a little and then straightened out the lateral incisions, making a vertical one, and secured the parts with ligatures. The result was an upper lip as broad as the under, and of normal proportions, which left little further to be desired.

SECTION VII.—Continued.

Some New Points in the Anatomy of the Face and Jaws.

PAPER BY M. H. CRYER, OF THE SECTION.

THE paper read this morning by Dr. Brophy, of Chicago, demonstrating his operation for cleft palate in early childhood, has caused me to somewhat change my paper and lantern exhibit in order to show that Dr. Brophy's operations are justifiable from an anatomical standpoint, and that the results they produce are not "miracles." All things are plain to those who know; to those who do not know or do not understand the workings of nature, "miracles" may explain cures they cannot otherwise comprehend.

Dr. Brophy's operation consists of paring the edges of the cleft, then passing sutures through the jaws above the alveolar process, and forcing the edges of the cleft together. (See Dr. Brophy's paper for details.)

There have been some objections to Dr. Brophy's operation on account of narrowing the arch. This I think is a mistake. Of course after the operation has been performed, if the jaws be examined, the upper one will be much smaller and narrower than the lower jaw. If an infant of the same age with a normal mouth be examined, a like condition will be found. In fact, if the teeth and alveolar ridges of both jaws be excluded, the upper jaw is smaller and narrower throughout life. This will be demonstrated by the following slides:

Fig. 1 is a picture taken from a fetus of about seven months. The skull has been cut perpendicularly, showing a transverse section of both jaws, mouth, and nasal chambers. It is quite symmetrical, and it will be observed that the section has been cut in the

region of the developing deciduous molar teeth of both jaws, and that the width of the upper jaw is much less than that of the lower.

FIG. 1.

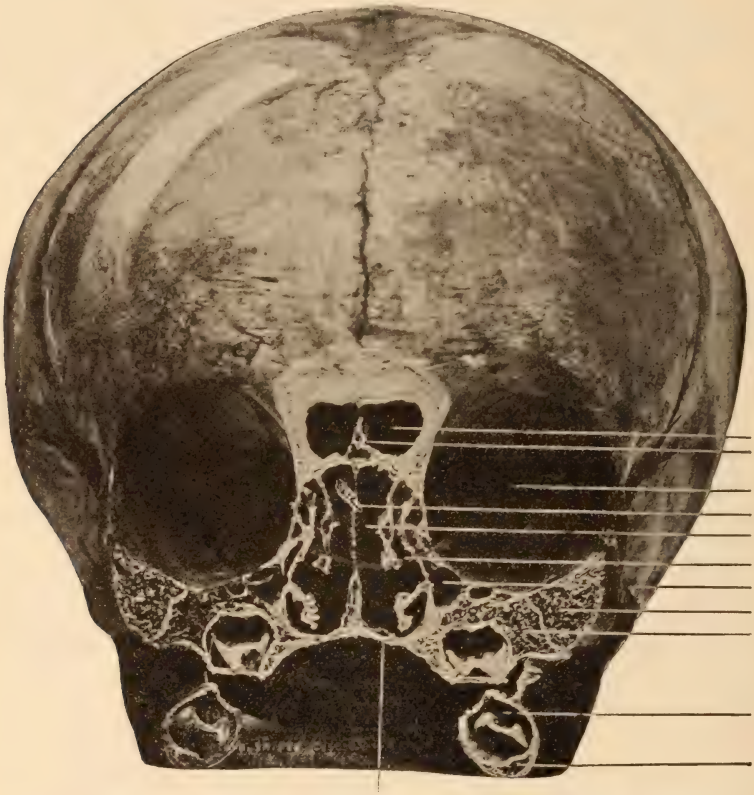
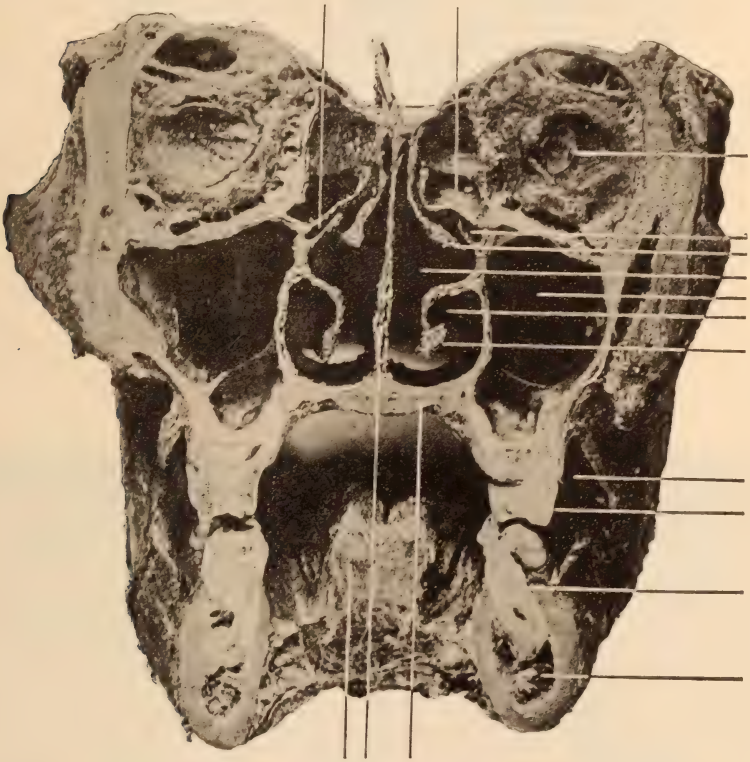


Fig. 2 shows a similar section taken from an adult person, a symmetrical skull having a full set of teeth erupted into their normal positions. If the teeth and alveolar process be excluded, it will be observed, as in the fetal skull, that the upper jaw is much smaller than the lower. If a line be drawn through the longitudinal center of the upper teeth it takes a somewhat outward direction as it passes down; while in the lower jaw a line drawn in a similar manner would pass slightly inward as it extends upward. This relative arrangement it is which allows the upper teeth to overlap the lower ones and form the proper occlusion.

Fig. 3 is taken from two skulls of about the same shape and size. They vary, however, in age, that on the left being from an adult of about twenty years old, and having a full set of occluding teeth. The direction of the upper and lower teeth can be observed. The right picture is from a person of, I should judge, about seventy-five years or more, where all the teeth have been lost and the alveolar

Fig. 2.



process has been resorbed, showing the upper and lower jaws in their normal size and shape, minus the teeth and alveolar process.

Fig. 4 shows side views of the same skulls. Those who have studied the development of the face know that the lower jaw is made up of two symmetrical processes, while the upper jaw has four processes, two from the sides and two from above. At about the fortieth day of intra-uterine life these processes should unite

and form the upper jaw; they occasionally fail to unite, the extent of lack of union varying in degree. Various reasons have been

FIG. 3.

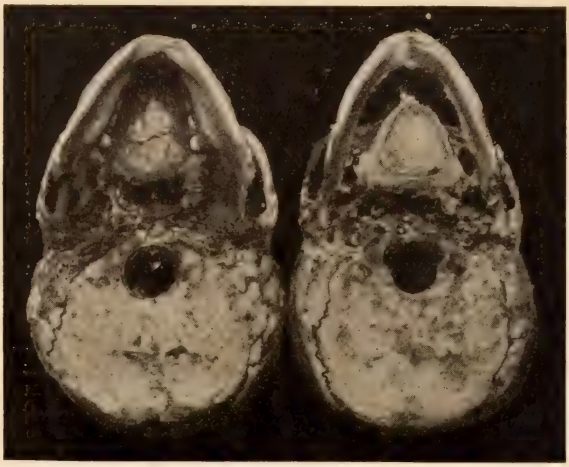


FIG. 4.

given for this lack of union, perhaps the most prominent one being malnutrition during the time that the union should take place. It is commonly understood that the lower jaw is the first bone formed.

Such being the case, does it not seem reasonable that occasionally the lower jaw might be more advanced in its development, and falling in between the forming processes of the upper jaw would prevent them from properly uniting? This would also cause harelip. It is generally accepted that the lower jaw is the matrix or form upon which the upper jaw is molded by contact, either through the alveolar process or the teeth. In what are termed mouth-breathing children or persons there is often found a narrow, contracted arch, caused by the non-occlusion of the teeth. If a person be a mouth-breather the teeth are kept asunder and the lower jaw does not force the upper teeth out to their normally arched arrangements. More than this, certain of the facial muscles drag upon the upper teeth and carry them inward.

If an examination be made of a young child with a complete cleft it will be noticed that the line of the upper alveolar ridge will be immediately over the alveolar ridge of the lower jaw, or it may be external to it; in the normal child or in the person of advanced age, the upper alveolar ridge is on a line within that of the lower jaw, as is well illustrated in the pictures shown.

In Dr. Brophy's operation he pares the edges of the cleft. These are usually somewhat hypertrophied in early childhood, so that in removing the edges he loses but little, if any, normal tissue. By passing the suture through the jaw he brings together the parts which were abnormally separated, but does not contract the jaw as has been claimed, which explains why the patients he exhibits do not have contracted arches. I would suggest to him, and to others who undertake this operation, to keep a sharp outlook for anything that would cause mouth-breathing, such as adenoid growths in the naso-pharynx, for if this be not avoided a contracted arch will probably result, as we often find even when there has been no operation for cleft palate.

The finding of large numbers of impacted teeth, both in the cadaver and in the living subject, has created a desire to know something of the cause of such impaction. At the Asbury Park meeting of the American Dental Association for 1895, I gave illustrations of a number of impacted teeth. (See *Dental Cosmos*, January, 1896.) Since that time I have seen examples in the living person of nearly all the cases then described.

It is evident that there is an active process, varying in degree

according to age, going on in the osseous surroundings of the teeth from the time of the development of the first tooth until the eruption of the first molar; even then it does not cease.

As the teeth are worn down they become more or less diseased and lost, and the alveolar process is resorbed, and in old age the jaws take the shape shown in Figs. 3 and 4.

If the active process going on in the jaws be interfered with, the normal eruption and arrangement of the teeth must be modified in proportion. The interference causing impaction can often be attributed to the many diseases of children, as scarlet fever and others which cause an inflammatory condition in and about the jaws.

In order to get a better idea of the arrangement and position of the deciduous teeth, and the organs developing into the permanent ones, Fig. 5 is introduced. It is taken from the skull of a child of about six years of age. The external walls of the alveolar process of the upper and lower jaws have been removed, together with some of the cancellated tissue, exposing the roots of the deciduous teeth and the crowns of the permanent ones. It will be noticed that at this age nearly all the space of the maxillary bone is occupied by the dental organs, there being but little room for the maxillary sinus. By interference with these organs, at this period of life, it will be seen how easily these teeth can be deflected or detained from assuming their normal position, interfering with the sinus or nasal chamber, and how, by these chambers being changed, associated cavities and adjoining structures will also be changed.

There are two opposite results associated with inflammations within the jaws. One is suppurative, causing the breaking down of tissue, the other is the building up and hardening of tissue, through which the cancellated tissue is transformed into hard and dense bone. (See illustrations given in the *Dental Cosmos*, January, 1896.) Through this hardening of the bone before the proper eruption of the teeth, they become incased within their capsules in the adjacent bone, under which circumstances it would be impossible for the eruptive force to carry them into proper position. They are often held in their place of development, or pushed in the direction of the least resistance, until resorption of the bone-tissue occurs, and then they usually make their appearance in an abnormal position.

Fig. 5.

Fig. 6.

The development of a supernumerary tooth or teeth may also cause impaction of a normal tooth. There are two marked cases that have come under my observation. The first is in a skull belonging to Dr. Kirk's collection, where thirteen supernumerary small teeth had developed in front of the left upper central incisor, which was found upon dissection to be impacted between the floor of the nose and the roof of the mouth. (See report made by Dr. Kirk, *Dental Cosmos*, April, 1898.) The other was in the mouth of a patient of Dr. Huey's, where thirty-five small supernumerary teeth were found within the alveolar process, in the space which should have held the left central incisor. After removing the supernumerary teeth the permanent normal incisor could be seen resting between the plates of bone forming the roof of the mouth and the floor of the nose.

Fig. 6 is taken from the skull in Dr. Kirk's collection. It affords a good illustration of the condition found in the mouth of Dr. Huey's patient. In Fig. 5 it will be noticed that the position of the developing upper second and third molars is very close to the under surface and posterior portion of the orbit. This was interestingly demonstrated by a patient referred to the Department of Dentistry of the University of Pennsylvania, who has an upper third molar impacted, the crown of which is in the upper posterior wall of the maxillary sinus.

Fig. 7 is from a made specimen which was constructed in order to secure a photograph which would give an idea of the position of the tooth in the patient's mouth. If this tooth has roots of normal length they will extend backward across the spheno-maxillary space, the points of the roots will be near the sphenoidal sinus, and the roots will be covered with a thin lamina of bone developed from the maxilla. In June last, while Dr. Kyle, of Philadelphia, was speaking of this case before the Section of Laryngology and Otology of the American Medical Association, Dr. Stout, also of Philadelphia, thought it strange that a tooth should pass upward instead of downward. In my opinion the tooth referred to has never passed downward from its place of development; through some inflammatory process the tooth and its capsule had become adherent to the posterior wall of the maxillary bone, the "intrinsic force" being insufficient to force the tooth into proper position at the time it should have made its descent. It is somewhat analo-

gous to an adherent testicle in the abdominal cavity or in the inguinal canal. There is no more reason to think that the tooth passed upward than to say a testicle had passed up from the scrotum into the canal or abdominal cavity.

In former papers upon variations of the maxillary bones and their adjacent parts, an endeavor was made to show that there was quite a constant anatomical law; that when the mouth, palate, and dental arches are bilaterally symmetrical, with proper occluding teeth, the

FIG. 7.

FIG. 8.

other structures of the face will exhibit a like condition; even more, the bilateral symmetry will be found to extend throughout the body. However, this law, as all others relating to anatomical science, is open to exceptions.

The great majority of persons do not have this bilateral symmetry within the mouth, consequently the internal structures of the face are changed and modified. The reason given for impacted teeth will afford a partial explanation of other deformities and variations in the region above the teeth. To avoid this deformity close attention should be given during the development, growth, and eruption of the permanent teeth, also the growth of the alveolar processes, and great care should be given to the deciduous teeth,

the mouth in general, and the nasal chambers and the naso-pharynx, and to any constitutional disease that may influence the formation of these parts. Diseased teeth causing inflammation should have proper attention, as they can bring about constructive periostitis or a suppurative inflammation. If the former, the bone becomes dense and the permanent teeth are prevented from taking their proper position in the jaws, thus causing malocclusion of the

Fig. 9.

teeth. Malocclusion will certainly modify the shape of the mouth, and this modification will have an important bearing on the shape of the maxillary sinuses and other internal structures of the face. A suppurative inflammation may bring about the softening of the surrounding tissue, which again will have its influence in modifying the character of the internal structures of the face. Under such conditions occlusion of the teeth brings pain, which causes the person to keep the jaws apart. This allows the intrinsic force acting upon the teeth to make them "elongate," and by not having

proper pressure of occlusion upon them during their eruption the upper teeth fail to be carried to their normal position as when the parts are normal, thus causing a contracted arch, which again changes the character of the cavities of the internal face.

Fig. 10.

Fig. 11.

The naso-pharynx, next to the teeth, should have the closest attention, as the closure, partial or complete, of the posterior nares will cause "mouth-breathers," in whom the teeth are not occluded. Through this the teeth elongate, and are not pushed outwardly to

overlap those of the lower jaw, thus giving a narrow, high arch and its concomitant defects.

Fig. 12.

Fig. 13.

The slides following will illustrate some of the various changes that have been brought about by the causes given for such modifications.

Fig. 8 is from the front view of a skull which has not a true

symmetrical arch of the mouth, the greater portion of the teeth having been lost early in life.

It will be noticed that the canine fossa of the right side is lacking, the face being bulged out at that point. The teeth have not been in normal positions. The septum is deflected toward the right side. In a skull of this character the internal structures will usually be very much out of symmetry; quite different from the condition shown by Fig. 3. One might suppose that a large antrum would be found under this projection, but in this particular case it is not so.

FIG. 14.

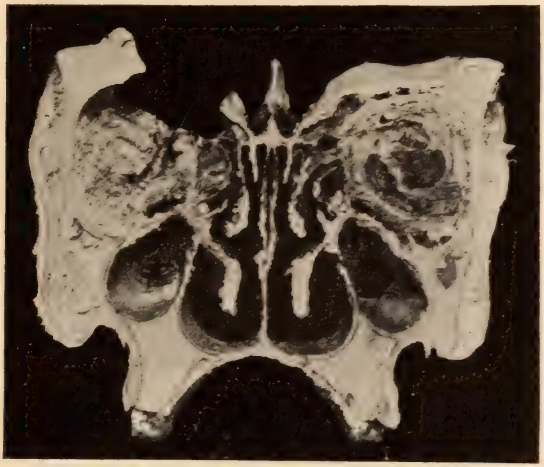


Fig. 9 presents a transverse section of the last skull shown. It will be seen that the right antrum is smaller than the left, the fullness of the region in the infraorbital foramen and the canine fossa being due to the thickness of the bone. The frontal sinus of this specimen extends downward between the orbits lower than usual.

Fig. 10 exhibits an entire lack of symmetry between the nasal fossa and the sinus of the right side, the inferior meatus on one side being closed anteriorly by the deflected nasal septum and "spur" passing over and against the inferior turbinate and carrying it toward the outer wall of the fossa.

In Fig. 11 it will be noticed that a line or instrument passing

through the axes of the alveolar process of the right side would perforate the nostril instead of the front of the maxillary sinus.

Fig. 12 is taken from a different skull, and has almost a straight septum and bilateral symmetry as to the nasal chamber; the maxillary sinuses, however, vary throughout the depth of the skull. On the left side the antrum would not be reached by drilling through the alveolar process.

Fig. 15.

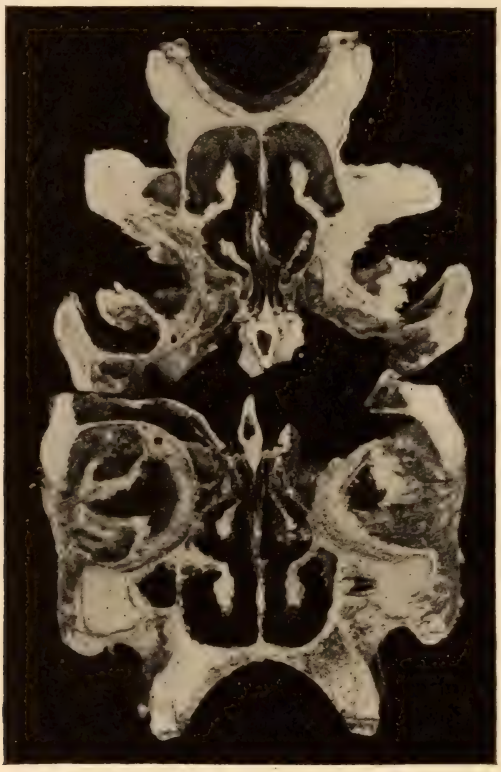


Fig. 13 is from a different skull, a transverse section made in the region of the first premolar. The septum is almost straight, the nasal chambers nearly symmetrical on both sides, but there is a great variation in the maxillary sinus. The outer wall of the nasal chamber of the right side is the outer position of the maxillary bone, the floor of the antrum being on a much higher plane. In

the floor of the left nasal chamber will be noticed an elevation which covers a tooth root, more than likely that of a supernumerary tooth. It may have been noticed in Figs. 10 and 11 that the nasal walls of the right inferior meatus, and in Fig. 12 that the left meatus,

Fig. 16.

Fig. 17.

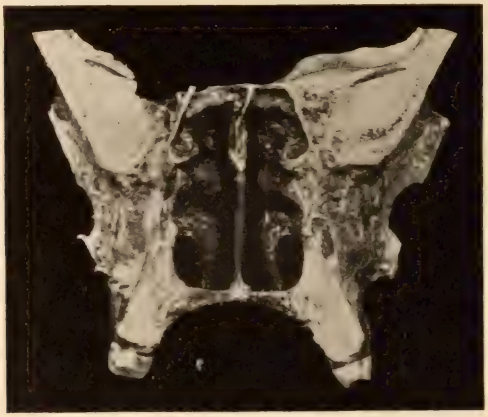
passed outward under the maxillary sinus to the facial portion of the maxillary bone; the same condition will be observed in Fig. 13 in the distal portion of the zygomatic wall. We often read and hear of the surgeons opening into the maxillary sinus through the canine fossa; if such an operation were performed on the skull of the specimen from which these photographs were made, the instru-

ment would pass into the nasal chamber instead of the sinus. I have known such occurrences to take place.

Fig. 14 is a transverse section made through a skull in the region of the second molar. The septum is straight, the nasal chamber and its appendages and the maxillary sinuses are small, and do not extend downward in the direction of the teeth and the alveolar process.

Fig. 15 is a section from the same skull as Fig. 14, cut more anteriorly, in the region of the bicuspids. Here we find the parts

Fig. 18.



are almost symmetrical. The crista galli has been cut transversely, showing within the walls a cell of considerable size; its opening is into the frontal sinus.

Fig. 16 is made from the skull of an old person, in which the bones have been much resorbed; it is comparatively symmetrical, with the floor of the sinus much higher than usual and the nasal fossa passing outward to the external portion of the maxillary bone.

Occasionally in surgical practice abscesses are found opening on the face in the region of the malar bone. These are often looked upon as of superficial origin, but when carefully examined they are found to be associated with the maxillary sinus. Fig. 17 will partly explain why, occasionally, abscesses of the maxillary sinus open at this point; the section is made in the region of the maxillo-malar

articulation through which the maxillary sinus passes far into the malar bone, extending backward into the zygomatic process.

FIG. 19.

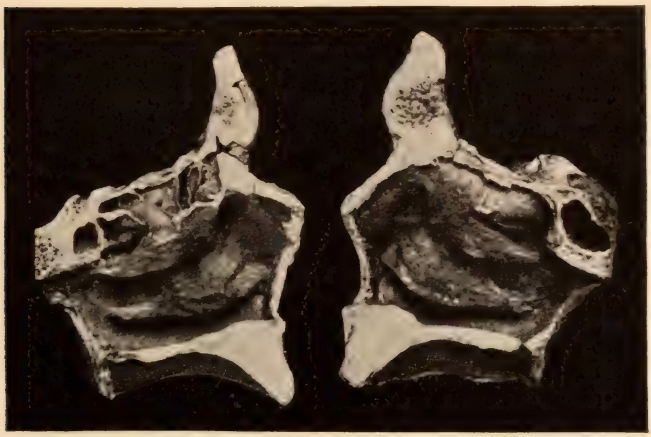


FIG. 20.

As far as I am acquainted with the text-books used in American medical and dental colleges, they do not properly describe the external walls of the nasal chamber, nor do they describe fully the outlets or passage-ways from the various sinuses and air-cells. As to

the meati, the books teach that there are three; this should be corrected. Zuckerkandl has stated that about sixty-two per cent. of the skulls examined have four meati; I have found fully that number in the skulls I have made sections of, and in many cases have found five. I do not know of five being mentioned by the writers. In one skull I have found six meati on each side.

The general teaching of books is that the fluids from the lachrymal glands flow into and through the first or inferior meatus; those from the frontal sinus, anterior ethmoidal cells, and maxillary sinus

FIG. 21.

flow through the second or middle meatus, and those from the sphenoidal sinus through the third or superior meatus. There should be added to the fluids flowing through the middle meatus those from the middle ethmoidal cells. The most constant cell emptying its fluids into the third meatus is the one found in the orbital process of the palatal bone, while in the fourth meatus, "the supreme," there are the fluids from the sphenoidal cells and other posterior ethmoidal cells. Where there are five meati, the fluids of the posterior ethmoidal cells flow into the fifth.

Fig. 18 gives a view of a section near the posterior nares looking

forward; it will be observed that there are six meati. This is the only case I have noticed, in my section cutting, showing so many.

Fig. 19 gives a typical view of the lateral walls of the nasal chambers from the same skull. They are almost symmetrical. It will be noticed that the ethmoidal cells are exposed in the right picture. In both of these four meati are plainly seen, and in one there are five.

Before dismissing this illustration I wish to call attention to a pathological condition. It will be noticed that there is a deposit

Fig. 22.

filling the space in the region of the frontal sinuses. It was spongy at the part shown. In one of the specimens I cut the outer wall away in order to more fully expose and examine it, and I found that the spongy condition became more and more solid as it extended outward until it was much harder than ordinary bone.

Fig. 20 shows the outer portion of this hardened structure projecting into the open space of the lateral portion of the frontal sinuses.

The shape and septa of the maxillary sinus vary so much that it is almost impossible to say what is a typical shape and what are typical septa. The pictures shown when speaking of the shape and

extension of the nasal fossa will give an idea of the variation in a transverse direction. When they are cut from before backward the shape and size will again be found to vary considerably. Par-

FIG. 23.

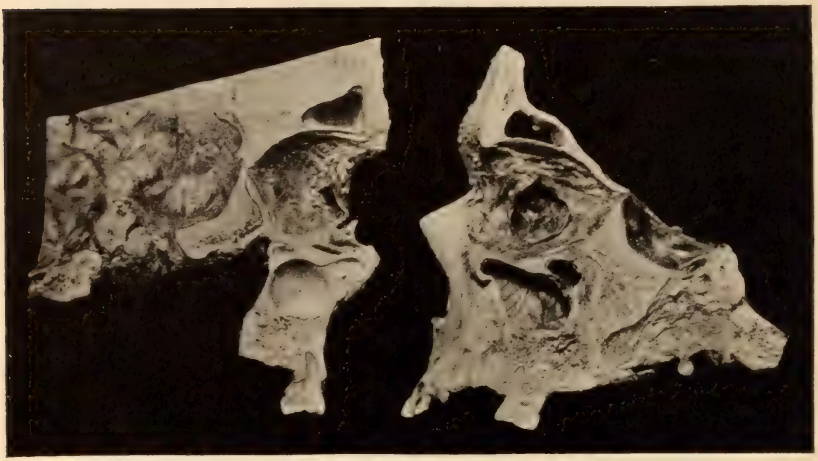


FIG. 24.

tial bony or membranous septa are found passing in various directions across the sinus; but I have been unable to find complete septa of the maxillary sinus, though it is claimed by some investiga-

tors that they exist. These parts can be better explained as we pass from one picture to another.

The two maxillary sinuses in Fig. 20 are smaller than are usually

Fig. 25.

Fig. 26.

found. It will be noticed that there are slight ridges in the floor of the sinuses suggesting the formation of septa. As I have said, complete bony septa of the maxillary sinuses are spoken of. I have been unable to find such conditions, although I have speci-

mens which, when looked at in a casual way, could be classed as such.

Fig. 21 shows what might be thought a bony division of the maxillary sinus; but close investigation reveals that the crescent-shaped cavities situated on the upper posterior corner of the sinus are the cell of the orbital process of the palate bone cut in two. A small probe passed through the openings in the right side would enter the superior meatus of the nose.

Fig. 22 is a section of a negro's skull, made through the molar teeth and the middle of the orbit. It shows a sinus at the upper posterior corner of the maxillary sinus. This opens into the superior meatus of the nose and belongs to the palate bones. It will be noticed that the antrum is of a very small size.

Fig. 23 is from the left side of another skull. The section is made in the same region as the last, showing a very small, peculiarly-shaped antrum and a crescent-shaped cell, which opens into the superior meatus.

Fig. 24 is from the left side of another skull, showing two sinuses. The posterior one passes around the posterior border of the external surface of the anterior sinus. The bony septum of this specimen might very easily be considered as a division parting the antrum into two; but I would not thus classify it, as this posterior sinus opens into the superior meatus, as do the others.

It is a well-established fact that the maxillary sinus is developed by an invagination of the mucous membrane of the middle meatus into the body of the superior maxillary bone. If we should have two of these invaginations from the meatus I could easily accept as a fact that these cells were a divided maxillary sinus; but as the outlet of the posterior one is into the superior meatus, and as the cells of the orbital process of the palate bone open into the superior meatus, I claim that this is an enlarged palatal sinus or cell and not a divided maxillary sinus.

Fig. 25 is another section made through the molar teeth and the center of the orbit. Posterior to the maxillary sinus we find another sinus of a different character, which, to judge from superficial observation, might be thought to be related to the maxillary sinus as those belonging to the palate bone. Upon passing a probe into this it leads into the supreme or fourth meatus of the nose, showing that it is related or connected with the sphenoidal sinus.

In fact, it is a very large sphenoidal sinus extending out laterally in a line almost to the outer part of the maxillary bone.

Fig. 27.

Fig. 28.

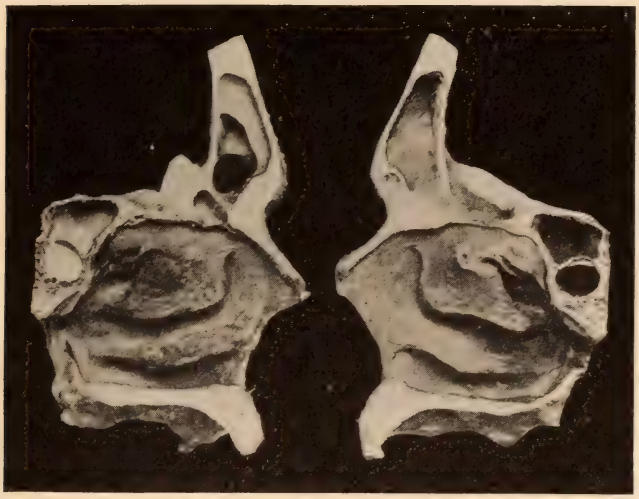


Fig. 26 gives a view of the external wall of the nasal fossa of the same skull, the sphenoidal sinus in the right-hand picture extending outward until it passes into the opening posterior to the max-

illary sinus in the preceding slide. It will be observed that this large sphenoidal sinus extends well forward toward the frontal bone and backward toward the basilar process of the occipital bone.

Fig. 27 is an outer and inner view of the same section. In the right-hand picture the cut is made through the bicuspid teeth, and a little to the inner side of the middle of the orbit, exposing the inner wall of the maxillary sinus, the cells of the palatal bone, and the sphenoidal sinus, over which is seen the sella turcica.

Fig. 29.

In the anterior clinoid process it will be noticed that there is a triangular opening which leads to the sphenoidal sinus; in the left-hand picture the external wall of the nose will be observed, and in the region of the body of the sphenoidal bone a very large sinus, at the bottom of which will be noticed a space under the sella turcica shown in the right-hand picture.

It is generally accepted that there are great variations in the frontal sinuses. The next three slides will demonstrate this to a marked degree.

Fig. 28 is made through the median line of the face, showing the external walls of the nasal chambers. Each picture shows four distinct meati. The object of this slide is to show the large frontal

sinus of the left side. It passes over to the right of the median line, leaving little room for the right frontal sinus in its normal position. This is shown in the left-hand picture. Often where such things occur the opposite side will extend its air space in the other direction to make up for the loss by the invasion.

Fig. 29 is made from the right-hand picture of Fig. 28, cut through the center of the orbit, showing that the frontal sinus has extended backward over the orbit to the region of the optic foramen. It has extended also outward to near the external lateral process of the frontal bone.

Fig. 30.

Fig. 30 is made from a skull where the frontal sinus has extended upward under the region of the frontal eminence and downward to the middle of the orbit or almost on the level of the upper portion of the maxillary sinus.

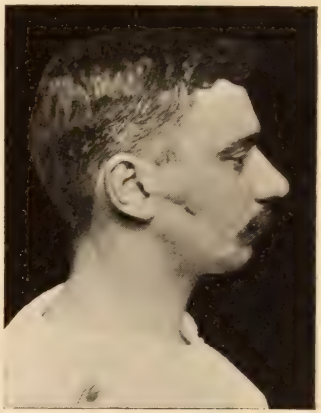
In a paper read before the Dental Society of the State of New York in May, 1898, and published in the *Dental Cosmos* for November of that year, I spoke of a general law which influences bone modification by abnormal muscular or other forces,—*i.e.*, "The normal application of forces to developing bone results in the normal development of the form of the bone. The abnormal application of forces under the same circumstances results in the development of an abnormal form. Abnormal application of forces to bone in adult life will also change and modify the shape and char-

acter. The bone becoming changed, the whole body is modified according to the change in the bone-tissue." The modification of bone by abnormal muscular force is well illustrated in those persons suffering from false or true ankylosis of the temporo-maxillary articulation. The illustrations are taken from a patient and from the bones of two skulls.

Fig. 31 is from the photograph of a patient. Judging from the general outline of the face, with its protruding lips and receding chin, one might be inclined to classify the person as a degenerate so often spoken of by some of our writers. By this picture, and

Fig. 31.

Fig. 32.



others to follow, I wish to demonstrate that this is the typical face belonging to those having, or who have had, ankylosis of the jaw, be it a false or true one. This patient has suffered from a false ankylosis since about nine years of age.

Fig. 32 is taken from the right side of the same face, showing a scar extending from the angle of the mouth upward and backward to the region of the external auditory meatus. This scar was produced by a gunshot wound. In passing, the shot severed the masseter muscle as well as a portion of the buccinator. In the healing of the tissue false bands were formed, extending from the lower jaw to the malar bone and the zygomatic arch, thus preventing the mouth from being opened. The treatment consisted in cutting the false bands and using the mouth-gag with a screw arrangement.

The operator was afterward assisted by the patient in forcing the jaws asunder, as shown in Fig. 33. The main object in using the appliance was to prevent these false ligaments from being reunited, and to stretch the temporal and masseter muscles of both sides. In a few weeks the patient could open the jaws without the appliance, as shown in Fig. 34.

FIG. 33.

Fig. 35 gives a view of a typical ankylosed jaw, made from the opposite side of the ankylosis. It will be noticed that the condyloid process is shortened and that the articulated surfaces are changed. Instead of being rounded on the top it is more of a gothic shape. The angle of the jaw is much depressed at the point, and under the mental foramen the jaw is full. The mental process

is almost lost by its recession; the coronoid process appears elongated. This is through the shortening of the condyloid process.

Fig. 36 is taken from the side of the same jaw, showing the condyloid process completely changed; it is flattened out with a number of serrations. The articulating surface of the glenoid fossa

Fig. 34.

is also changed to correspond to the condyloid. The angle of the jaw is much more changed than on the opposite side, causing a deep depression in the region of the facial notch.

The lower jaw, under the mental process, is more full and roughened, and the mental process more receded than on the opposite side.

Fig. 37 is from a skull with a complete or true ankylosis, taken

from the opposite side of the union. The close resemblance to Fig. 38 will be noticed in the complete ankylosis, the descending angle, the receding chin, etc., as shown in other pictures.

Finding this condition in all cases of prolonged ankylosis, it becomes evident that there is a cause for it. The muscles of mastication—*i.e.,* those which close the jaws—are inactive, while those which assist in opening them become more and more active in their

Fig. 35.

Fig. 36.

work, with an endeavor to overcome the closure of the jaws. By this action the lower jaw, from the symphysis to the angle, becomes modified in proportion to the contraction of the depressing muscles of the jaw. Anteriorly there are the genio-hyo-glossus, the sterno-thyroid, the sterno-hyoid, the digastric, the omo-hyoid, and the platysma myoides.

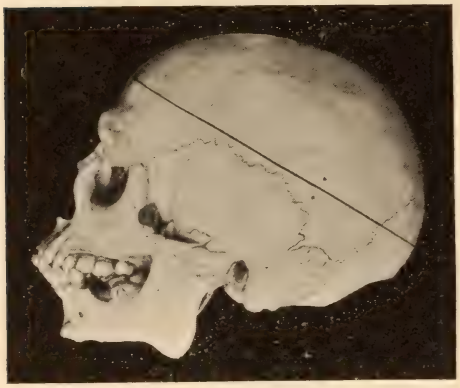
Fig. 39 is a picture taken from the same patient as Figs. 31 to 34. It is made while he endeavors to open the mouth, and will illustrate

the various muscles under spasmodic action, showing the changes which their constant action will cause to take place in the form of the bone.

Having shown in the last few slides how muscular action changes the character of the face in modifying the lower jaw, I have thought

Fig. 37.

Fig. 38.



it well to give illustrations of a case where the abnormal growth of bone brought about almost the same result, so far as appearance goes. In February, 1893, Dr. J. W. Hisey, of Cleveland, brought to the Hospital of Oral Surgery a boy of fifteen years. The boy was well developed, bright, intelligent, and well educated. He

FIG. 39.

FIG. 40.

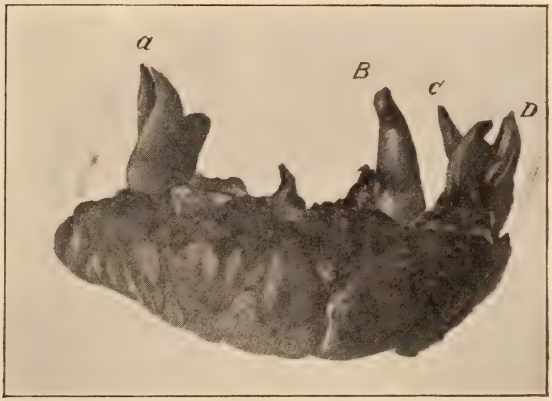
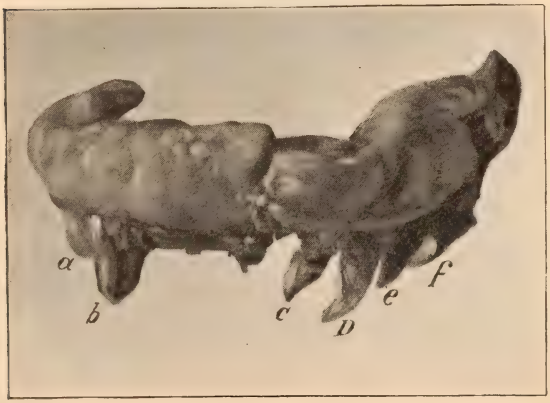


FIG. 41.



was afflicted with the most remarkable case of hypertrophy of the gums and alveolar process that has been recorded. The case was operated upon by the late Professor Garretson and myself, Febru-

Fig. 42.

Fig. 43.

ary 17 and March 11, 1893. (Full description of the operation will be found in the *Dental Cosmos,* June, 1893.)

Fig. 42 is from a photograph taken before the operation. Here again, as in the first picture shown in the ankylosis series, this boy appears to have anything but an intelligent face. On February 18 Professor Garretson decided it was best to open the upper lip at the median line and carry the incision around to the alæ of the nose. By the use of the surgical engine and other surgical instru-

Fig. 44.

ments the portion shown in Fig. 41 was removed from the upper jaw. It was thought best not to remove the abnormal tissue from the lower jaw at the same operation, so on March 11 the mass of tissue shown in Fig. 40 was removed from the lower jaw. This was accomplished without cutting the lip.

Fig. 43 is from a photograph taken shortly after the second operation, on April 28. Seven weeks after the operation the parts were thoroughly healed and his general health very good. He experienced less difficulty in articulating than he had previous to the

operation, and the improvement in his speech and general appearance was very marked.

The operation was commented upon rather unfavorably by one who makes a specialty of oral surgery. This comment was one of the reasons for keeping track of the patient, and seeing how far Professor Garretson's judgment was correct. I occasionally receive letters from him, and in his last one he forwarded me his last photograph, so I could judge of his general appearance. I think you will agree with me that he does not look like a degenerate, and that the operation made a tremendous improvement in his appearance, and conclusively demonstrated that Professor Garretson was right. Fig. 44 is made from this photograph.

SECTION VII.—Continued.

Some Oral Surgery Cases and the Lessons they Teach.

Described by GEO. V. I. BROWN, of the Section.

THE purpose of this discussion and these illustrations is not intended, in any sense, to be merely a record of personal achievement, but primarily to call attention to principles vital to that special branch of surgery which we represent. The most active consideration that presents itself to the oral surgeon, one upon which his success largely depends, is the distribution of a general understanding of the particular operations which, by reason of special training as a dentist, he can do better than the general surgeon, for only in this way can sufficient confidence be established to bring about more frequent consultation and reference of cases.

The error on the part of the oral surgeon, commonly, is to claim too much, as for instance, when considering the removal of tubercular cervical glands, every good surgeon knows that dental training does not give especial fitness for such operations; moreover, when these glands are thus affected the glands of the axilla are frequently associated with the trouble, and they also must be removed. The field is then so widely spread as to be almost beyond limitation. This is likewise true of many operations formerly claimed as rightfully within the charge of the surgeon of the mouth.

These impressions are the stumbling blocks in the way of practitioners limited to this special field at the present time, for it is undoubtedly a fact that practitioners of medicine will, as a rule, be very willing to refer cases to the dentist whenever it may be apparent that familiarity with the technique of mouth operations, added

to a knowledge of surgery, has better fitted him for that particular work.

The subject of the accompanying photographs, Figs. 1 to 4 inclusive, was burned at the age of three years, and the cicatricial tissue resulting from neglect deformed him so that at the age of

Fig. 1.

twenty he presented the appearance shown in Fig. 1, his chin being fast bound to his chest, and one arm and hand securely grown upon his breast, with the wrist turned and the thumb twisted back upon itself, its palmar surface attached to the skin. The deformity of the face and jaws resulting from the continual dragging downward is shown by the fact that the first inferior molars on each side

occluded directly against the superior cuspids, the rest of the lower teeth projecting forward and outward. The first operation was performed by Dr. W. H. Earles, surgeon of the Milwaukee Medical

FIG. 2.

College, who dissected away the cicatricial tissue, thus setting free the muscles of the neck, and transplanted a large flap of healthy skin, which was taken from the shoulder of the unaffected side.

One week later the operation upon the jaw was performed by myself, by removing the projecting portions of the inferior maxillary, together with the anterior inferior teeth; a sufficient amount of the jaw was amputated at the same time to correct the deformity in appearance. The soft tissues of the lower lip and chin were dissected away, and upon the part of the jaw-bone which still remained,

Fig. 3.

owing to its unusual thickness, a sloping surface was smoothed, slanting upward and backward, which, when the soft tissues were folded back and bound down upon it, gave the appearance of a chin, this feature, of course, having been eliminated by the amputation of the jaw. The parts were bandaged securely in place, the mouth carefully cleansed with sterilized water and hydrogen dioxid, no other antiseptic being used, and in two weeks the entire exposed surface of the jaw-bone was found to be covered with a

healthy growth of mucous membrane, while the soft tissues upon the freshened bone surface were quite firmly united. Later on crowns were inserted and the inferior teeth bridged across from one side to the other, completing again the lower arch in this way. The operation was performed entirely with the surgical engine, and it is a notable fact that, in spite of the large portion of jaw re-

FIG. 4.

moved, the hemorrhage was so very slight that nothing more than hydrogen dioxid in the way of styptic was found to be necessary.

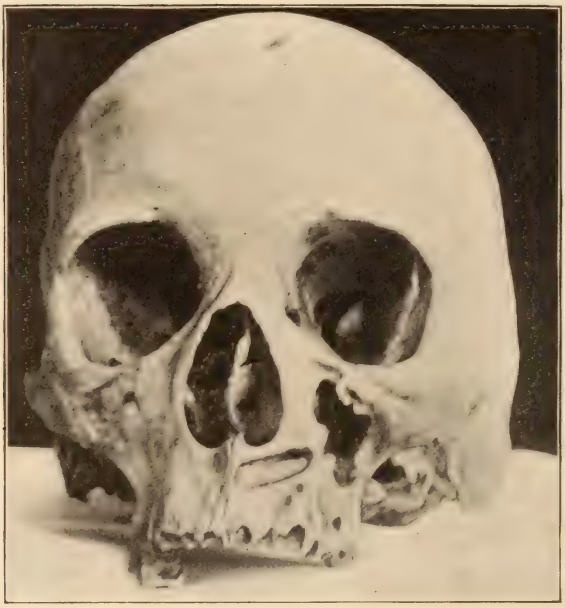
Fig. 2 shows the patient after the second operation, with his mouth as tightly closed as was then possible.

Fig. 3 shows the surface covered by the transplanted skin, and the patient just as he looked without any artificial assistant in the way of dress after the jaw operation.

Fig. 4 shows him as he left the hospital.

Aside from the question of improvement of a deformity, there are one or two considerations of particular interest in the case. In deciding upon the plan of operation, one performed recently in St. Louis by removing from each side of the jaw a section and bringing the parts together was considered, but the method adopted in this case was deemed to be safer, because at no time was there difficulty in keeping the parts in approximation, nor was there fear

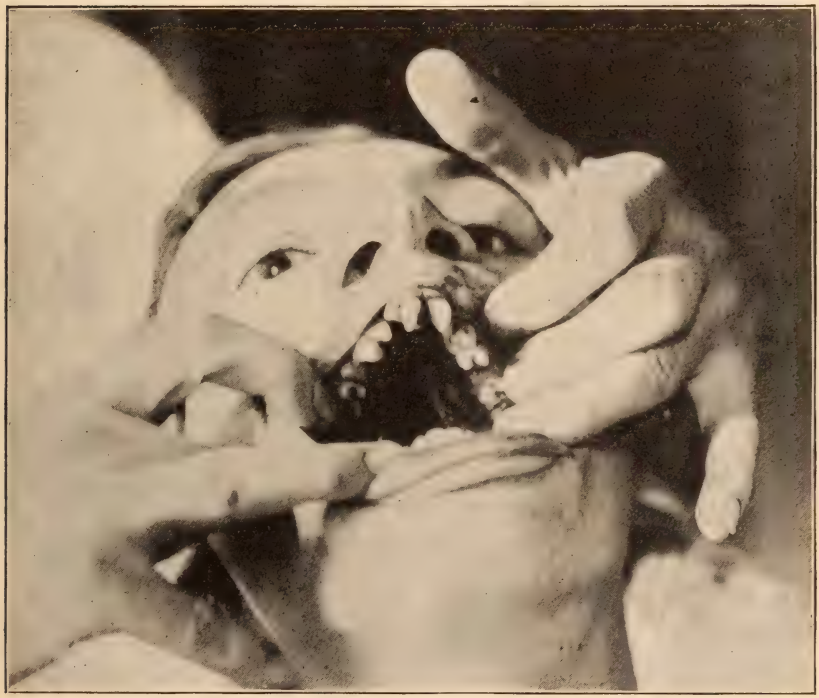
Fig. 5.



of necrosis through interruption of the normal circulation. Therefore a satisfactory result was obtained in from three to four weeks instead of perhaps months, as would very likely have been the case by the other operation. Besides this, it is believed a better appearance was gained, for had the protruding lower teeth been forced back and turned up they would still have had a fan-shaped appearance, which would have rendered them not only unsightly but practically useless, while the securely fastened crowns and bridgework will undoubtedly be permanently useful. The great thickness of the bone upon the lingual side of the anterior portion of the arch

is worthy also of consideration, because it illustrates a fact often lost sight of in the treatment of irregularities of the jaw,—namely, that usually something more exists than mere disarrangement of the teeth. The same causes which make irregularities in the dental arch also produce more or less structural change in form of development of the bones. It is this fact that points favorably in the

FIG. 6.



direction of many operations for the immediate correction of irregularities which contemplate the removal of certain portions of unusual bone development in the jaw as preparation for readjusting the arrangment of the teeth.

Fig. 5 shows a supernumerary tooth placed in a skull in exactly the same position as that from which it was removed from the superior maxillary bone of the original and photographed.

The history of the case is as follows: Patient, about forty years

old, has suffered excruciating paroxysmal pain, so severe that during the paroxysms, although a man of great courage, his suffering was almost beyond human endurance. When he came to my notice the pain was most constant upon the left side of the face, in the upper lip and ala of the nose, extending from there around the inferior maxillary, with hyperesthesia upon the surface of both

Fig. 7.

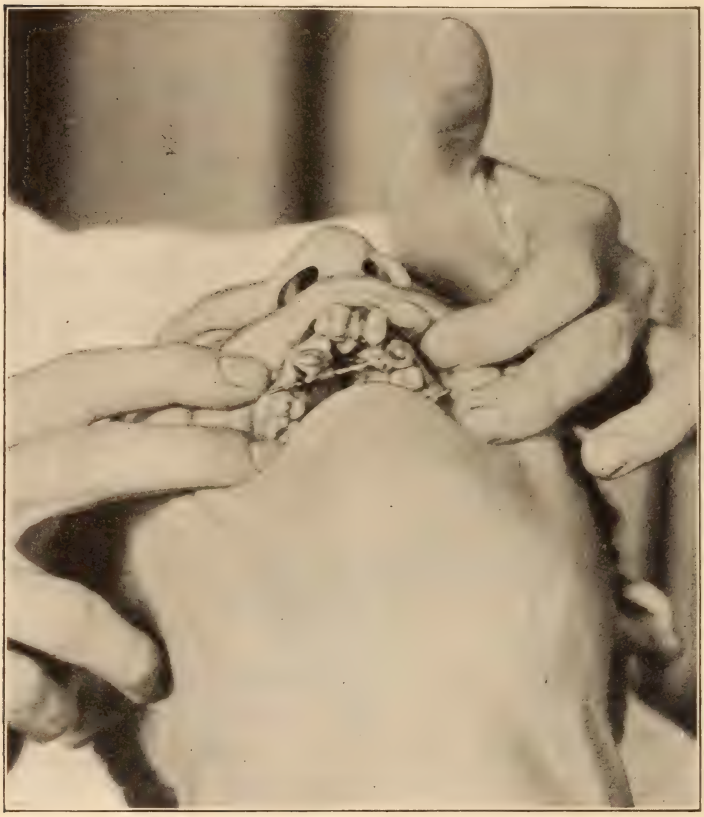
upper and lower lips. The pain was almost continuous, and for days and nights at a time he was never free from it, although during the paroxysms it was much more severe than at other times. For five years he had been unable to lie upon that side, because the mere touch of the pillow would throw him into intense agony. The use of the lips in speaking certain words was also likely at any moment to cause pain. Years before and at various intervals since the first

one, he had had some four operations performed upon the antrum of Highmore, at one time a tube having been inserted from the nose through into the antrum, presumably to give drainage. A careful study of the case resulted in the determination that his pain resulted from some peripheral irritation, and was not such as might be expected from a central origin. Satisfied upon this point, careful search finally connected the left superior central incisor, an apparently sound tooth, with the cause of the pain, and through the treatment of this tooth and subsequent extraction it was finally discovered that a supernumerary cuspid was buried in the superior maxillary upon the affected side, its crown resting against the lingual side of the root of the central incisor, its entire length extending transversely inward and backward, with the apex of the root toward the antrum, its path being directly across the floor of the nose. The removal of this was accomplished by the use of the surgical engine, relieving the painful condition so far as the superior maxillary was concerned, although the lower lip continued to be slightly affected as a result, doubtless, of some structural change in the nerve-sheath, by reason of the long-continued irritation. This, however, gradually disappeared, and the patient's return to good health became quite assured. Aside from the interesting history and many kinds of treatment applied, as well as the curious freak of nature which caused this development of the supernumerary tooth in that particular position, there being no external evidence of its existence, one lesson is that a closer study than is generally given should be bestowed upon the tracing out of every little symptom that might be useful for the purpose of differential diagnosis in neuralgias of the trigeminus, so that it would more often be possible to locate the definite cause of the trouble and give complete permanent relief instead of attempting palliative measures, which necessarily can accomplish but little.

Figs. 6, 7, 8 bring to your notice a young man twenty-three years of age, who had a cleft extending through both hard and soft palates, bifurcating so as to form double clefts, which separated the intermaxillary bone completely from the rest of the jaw. The case is one which ordinarily would have been considered quite beyond the possibility of surgical operation to effect a closure and would have required, by other treatment, the use of an obturator to cover the openings. Instead of this, however, the parts were freshened

and the edges of the bone trimmed away with a surgical engine, from the bicuspid teeth, along the line of the cleft, forward through each side of the intermaxillary bone. Then, as is shown in Fig. 7, a bur in the surgical engine was passed upon each side just back of the tuberosities of the superior maxillary bones, which were cut

Fig. 8.



through in such a manner as to allow the two sides of the jaw to be compressed sufficiently to unite the fissures in the anterior portion of the mouth. Regulating appliances with screws and nuts were attached to the central incisors, and from one bicuspid to its mate on the opposite side. Thus the intermaxillary portion was held securely in position, as were also the two sides. The result, as will

be noticed in Fig. 8, was complete union and closure of the clefts from the bicuspids forward. In order to reduce the width of the opening back of the bicuspids another screw appliance was placed across from molar to molar, and the turning of this screw from day to day has since so narrowed the interspace that the final surgical

Fig. 9.

operation upon the soft palate and the posterior portion of the hard palate has become quite a simple proposition. It is believed that this operation has never before been attempted upon a patient at such an advanced age, and it seems to be clear that a combination of the dentist's training and the principles of orthodontia with surgical procedure has given a result which could not have

been accomplished without knowledge both of surgery and dentistry.

Fig. 9 shows a patient for whom I removed a carious surface upon the malar bone by using the surgical engine through a fistula in the cheek. Other treatment would have required an incision with consequent scar from the outer corner of the eye nearly to the

Fig. 10.

lower jaw; but through two small openings that when healed look like dimples I have healed, by repeated injection of H_2O_2, a wound so full of pus that when we laid the patient upon the operating table the discharge flowed out in such quantity that it required a complete change of towels and protective dressings before the operation could safely proceed.

Fig. 10. The patient about seventy years of age. Sarcoma.

Gave a history of a growth beginning in the vicinity of the maxillary sinus, which had been operated upon some two years before, and from that time until the date of operation had grown to the size shown in the cast. Of course, on account of the age of the patient and the character of the growth, it was impossible to do more than

FIG. 11.

give mechanical relief by the removal of such portions of the tumor as interfered with speech and proper use of the mouth. It was apparent from the clinical appearance that as the growth progressed across the mouth its newer portions of development had evidently increased in rapidity of growth and malignancy, and a study of sections under the microscope corroborated this opinion by showing a portion to be almost entirely spindle-cell sarcoma,

while in other portions round cells appeared more and more thickly among the spindle cells, an evident tendency to increased malignancy and more rapid growth. Recently the patient returned after an interval of about four months since the first operation, and so rapid had been the development that she presented the appearance shown above. Again such portions as were possible were removed, and these under the microscope showed quite plainly the pigmentation of a melano-sarcoma. Pigment was also very apparent in the urine at this time. The interesting points of this case are that it is possible to do a great deal from within the mouth in the extirpation of such growths, without the disfigurement which would have resulted by cutting from outside the mouth, as shown by Fig. 11, although, of course, had an attempt been made to take away all that should have been with the idea of trying to prevent recurrence, a much more extensive, absolutely hopeless operation would have been necessary, and doubtless the face have been more or less involved.

In conclusion I wish to impress a final injunction upon the use of tissue-destroying escharotics and germicides that, though destructive to bacterial life, are also poisonous to the human organism. The illustrations under consideration give evidence that hydrogen dioxid is certainly efficient, when it is remembered that in all these cases outside of surgical efforts the main reliance has been placed upon this simple, harmless cleansing agent, almost nothing else having been used except sterilized water.

What we want to do under such conditions is to build up new tissue, not destroy it; to increase the vitality of the part, as does the oxygen set free, not impair it with corrosive agents; therefore it is believed good results were obtained much more safely and quickly because the actively destructive though powerful germicidal agents were absolutely excluded.

SECTION IX.

Orthodontia.

REPORT BY V. H. JACKSON, CHAIRMAN.

THERE have been but few papers published on orthodontia during the past year. Among them an important paper read before the New York Odontological Society by Professor S. H. Guilford, entitled "The Dynamics of Tooth-Movement."

An illustrated article by Professor E. H. Angle, on "The Classification of Malocclusion," from his forthcoming book.

A paper, with illustrations, of appliances made after the Jackson system, read before the Seventh District Dental Society of New York, by Dr. Frederick Messerschmitt.

The Section of Orthodontia has been duly organized, and your Committee has to report the following papers, which they recommend to be read before the Association:

"Extraction and Delay *versus* Expansion and Early Interference in the Treatment of Prognathism." Illustrated. By Dr. R. Ottolengui, New York.

"Results that follow the Extraction of Permanent Teeth." By Dr. E. A. Bogue, New York.

SECTION IX.—Continued.

Extraction and Delay versus Expansion and Early Interference in the Treatment of Prognathism.

PAPER BY RODRIGUES OTTOLENGUI, OF THE SECTION.

MR. PRESIDENT and fellow-members of our National Society: Gentlemen, I desire to present for your consideration the histories of two cases from practice which taken singly and separately might not justify my intrusion upon the society, but studied together I believe they so well illustrate the mischievousness of certain methods of procedure heretofore considered sound by many of our best men that a description of the two cases in detail will merit your attention.

About two years ago a case came into my hands which offered what seemed to me to be a rare opportunity to study certain modes of practice, and I determined to keep more detailed records than usual. At the time I had already bestowed several months' work upon a case of prognathism of the upper jaw in the mouth of a miss of ten, in which case I was working specially to demonstrate the advisability of beginning early with such cases, and by early I mean prior to the eruption of the permanent cuspids. In order to avoid confusion in the minds of my hearers, I shall designate the case already begun as Case A, and the other as Case B.

Case B was another prognathous upper jaw, and in this mouth also the temporary cuspids were still present, though the patient was nearing her fifteenth birthday. The previous history was one of extraction and delay, the first permanent molars having been removed. The family attendant who had advised the extraction of these teeth subsequently very kindly presented me with a model of

the mouth made at the age of ten. I was immediately struck by the great resemblance between this model and that of my Case A.

Fig. 1 shows the upper jaw of Case B as it was at the age of ten, while Fig. 2 shows the upper jaw of Case A at the same age. The resemblance is startling, for not only are the same teeth present,

FIG. 1.

FIG. 2.

but we find practically the same malposition of the teeth. I am not able to show the extent of the prognathism in Case B at the tenth year, because articulated models were not preserved, or at least were not furnished to me; but it was very probably the same as in the other mouth, judging from my close observation of the

two cases and from measurement of the two mouths at this early age, which show them to be almost identical. I will simply record, without comment at this moment, the fact that in this case, Fig. 1, the two permanent molars were removed, although sound.

Let me now proceed with the histories separately. As already stated, Fig. 2 shows the palatal aspect of the jaw in Case A. The extent of the prognathism is well shown in Fig. 3, your attention being especially called to the formation of the alveolar process in the incisive region. A study of Fig. 2 alone might lead one to suppose that the lateral incisor was the only tooth out of place, while after seeing the articulated models, Fig. 3, one might say that this same lateral was the only tooth in line, and that the other three

Fig. 3.

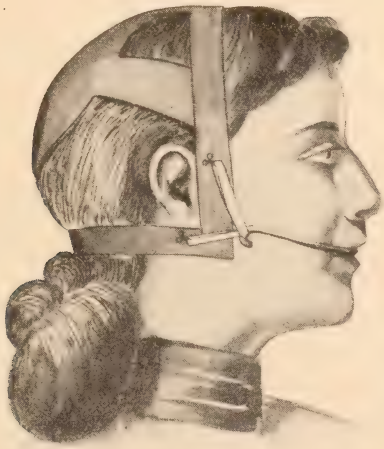
incisors should be reduced to conform with it. In the correction of this case, however, after reducing the prominence of the centrals and of the opposite lateral, this instanding tooth was carried out somewhat.

In undertaking this case at so early a period, I was seizing the opportunity of gratifying a long-cherished desire. I have believed for years that a jaw of this character, taken in time, could be so managed that eventually all asymmetry would disappear, room having been provided for all the unerupted teeth; and that this could be done in precisely that class of cases where usually at the age of fourteen or thereabout it is common practice, and frequently an absolute necessity, to sacrifice a bicuspid on each side. It is a great gratification to me to have carried this case to a successful issue, the jaws at the present time being in good pose, the teeth in good occlusion, the asymmetry, both external and internal, having been corrected, and all of the permanent teeth being in place, of course not including the third molars.

I will as briefly as possible give the details of treatment, dwelling only on such as may have special significance or interest.

The first requisite in undertaking this case was to proceed by such means as would provide stable anchorage for the retainer which would necessarily be worn for several years, especially during the period of shedding of the temporary teeth. It is manifest that at this age the first permanent molars, barely protruding from the gum, would have been of little service as anchor teeth for any internal mechanism. In fact, I venture to say that it would have

Fig. 4.



been practically impossible to rely upon these short teeth as supports for bands or clasps in any system of reduction known to me. Moreover, even were it possible to so utilize these teeth at the age of ten, it would have been a false step, because if disturbed in their sockets while the anterior teeth were being retracted they would have been of lessened utility as anchors for retaining the incisors in their new position, especially during the eruption of the four bicuspids and the two cuspids yet to appear. Consequently, in this or in any other similar case undertaken at this age, I can see no justifiable method except the skull-cap.

After many and varied experiences with many styles of skull-caps, I have had the pleasure of using the one shown in Fig. 4 in numerous cases without trouble of any kind in a single instance.

This cap is no haphazard product, but is the evolutionary result of many efforts to obviate unsatisfactory features of caps used in previous cases, not the least of which is undue pressure in the frontal region. This cap brings the resistance exactly where it should be, and where it is sustained with least discomfort; that is to say, at the crown of the head. For these reasons it may be advisable to take a moment to tell how one may be constructed.

The cap itself is of leather, and is lined with leather as well. The chief beauty in its construction is that each piece may be cut from a single piece of leather, so that there need be but four short seams, and these where they exert no irritating friction. The round piece, the skull-cap proper, has a piece projecting forward and backward, each in turn carrying strips at right angle to itself, while on each side another wider and shorter piece extends forward to meet the strap which passes down from the frontal region. Of the four seams mentioned two are seen in the figure, the others being similarly situated on the other side.

In making such a cap I begin with a sheet of stiff manila paper and cut out the skull piece, with simple projections forward and backward, and the two wide side pieces. All are made longer than required. The skull piece is slit in places, and, when fitting to the head, pins hold the lapped places where these splits were made. A narrow strip is then pinned at the proper place on the front and back extensions, and these in turn are pinned together where they should meet under the ear. Excess is cut away, and we have a pattern of the hat in paper. A similar cap is cut from linen buckram, and this is more accurately fitted to the head, care being taken to have it exactly as it should be; this precaution is necessary because the leather worker will follow the pattern blindly, any departure, if made, being usually in the wrong direction. I generally have had no difficulty in having my caps made by any practical shoemaker, and the cost is about two dollars.

The latest improvement that I have made in this cap has been to reinforce the terminals of the front bands with German silver, inclosed within the two pieces of leather. This piece of metal extends from near the extremity of the band to a point above the hook. This hook is fastened with thread, two holes being first drilled through the leather and metal to permit the passage of the needle. This stiffening is very advantageous, preventing wrinkling at this

part, which is liable to occur from the unequal strain of the elastic bands; but the metal is not carried up high enough to make the band uncomfortably rigid against the face.

We may now return to the specific case, though I should mention as one more detail in regard to the skull-cap that though the black cap is best for brunettes, when dealing with a blonde the color of the leather in the cap should match the hair as closely as possible.

The first active step in this case was the widening of the jaw, which was readily accomplished. Examination of Fig. 3 makes it

Fig. 5.

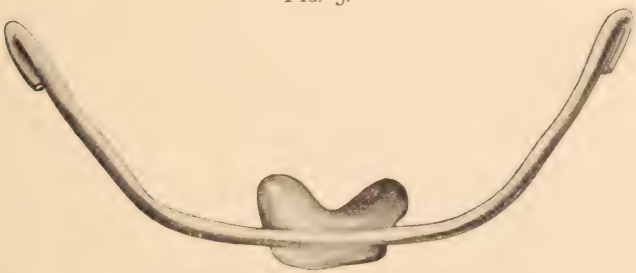


Fig. 6.

plain that not only must the crowns of the central incisors be moved inward, but the process itself must be bent; consequently the teeth should be carried bodily backward. It is needful to vary the bits used with skull-caps in accordance with the service which they will be required to perform. The bit used at the outset in this mouth is shown in Fig. 5: It is in effect a cap swaged to fit over the incisors so that the two teeth thus held were moved as one, force being so directed by the placing and direction of the arms that the teeth and process were moved inward. The caps are of platinum, and the extension arms are of rigid brass wire. These are soldered together with gold solder, and the bit is then heavily gold-plated. It will be noted that none of the usual provisions for movement of

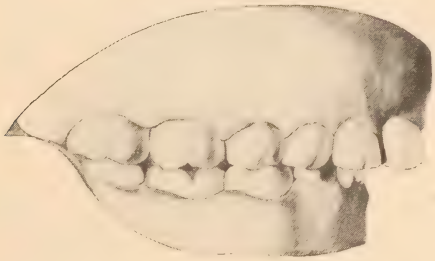
the arms, such as ball and socket joints, are provided. The theory of such apparatus is that the arms would otherwise trouble the child at night. I have had no complaint of that character brought to me by either children or parents, though I have never provided for such movement. After this last admission it may be thought that I am incompetent to judge of the action of movable arms, but, theoretically at least, I see many advantages in the rigid arm, the chief being that the child in sleeping does not produce unequal tension by pressing one arm against the face, the other being correspondingly pressed outward, thus causing more tension on that side upon which the child does not lie; a matter of importance when we remember that from habit one sleeps on the same side always. The rigid arm, on the contrary, is simply pressed into a soft pillow, and the tension of the elastics on both sides remains undisturbed. In regard to elastics, I formerly utilized bands as are seen in the figure, but in the cases under discussion and in all since I have adopted a different and more satisfactory method. I supply the patient with a box of the ordinary small elastic bands of commerce. When the skull-cap and bit are first introduced they are held in place by using just enough of these elastics to keep them steady, usually two bands over each hook. Thus the child endures no pressure, or very little, while growing accustomed to the apparatus. The child is permitted to remove this bit for meals, and easily replaces it herself. She is instructed to increase the number of elastics from time to time, and she is told that if at any time the teeth should grow to be sore she may remove elastics sufficient to give relief. By this simple means the force may be increased or decreased very gradually, and there is no reason why any serious pain should be experienced at any stage of the operation.

This bit, Fig. 5, was used until the two incisors had been carried back into line with the prominent lateral. The bit was then discarded, being replaced with the one seen in Fig. 6. Here the teeth are held in a cage-like fixture which allows them to be moved individually rather than collectively. Thus should the lateral reach its proper place soonest, which it usually does, the centrals can be carried farther in, without affecting the lateral, by merely bending outward that part of the wire which touches the lateral. Other alterations would occur to the operator in accordance with the requirements of the case in hand.

By these means the reduction was carried to a point where the jaws appeared as seen in Fig. 7, a very symmetrical arch having been attained. It would appear perhaps from the figure alone that the task was far from accomplished, but a study of the face as well as of the occlusion demonstrated that the fault originally lay not alone with the upper jaw, but that the prominence there was doubly noticeable because the lower jaw occupied an abnormally retreating pose. To correct the asymmetry of the features it was necessary to alter the pose of the lower jaw by jumping the bite, that simple operation which has excited so much adverse criticism.

The method of jumping the bite as announced by Dr. Kingsley so many years ago is well known. An inclined plane is erected upon a plate for the upper jaw, which, by engaging the incisors of

Fig. 7.



the lower jaw, compels the patient to close with the lower jaw in the forward occlusion. There are two periods, however, when this is far from a simple operation. After the eighteenth year, and sometimes sooner, the habit is so fixed that the patient does not readily break it up, and the result is that in attempting always to close the lower jaw in its accustomed retreated position the inclined plane operates to force outward the lower incisors. The same would be true in a very young patient, the lower incisors moving outward in such cases because they are so insecurely fixed in the jaw.

It was necessary therefore in this young patient's case to adopt such a fixture as would jump the bite without danger of projecting the lower incisors. The apparatus used is seen in Fig. 8. It is made of iridio-platinum, and the inclined plane is carried around the arch so that it engages all the teeth of the lower jaw, thus

obviating any undue influence upon the incisors. At the same time this appliance carried a retaining wire to restrain the three incisors which had been reduced. The wire projecting from the front of the plate, as seen in the illustration, was a temporary device to carry the instanding lateral out to line. When that was accomplished it was removed, a slight extension of platinum plate taking its place to act as a retainer. In passing from this figure I would call attention to the manner in which the retaining wire is attached.

Fig. 8.

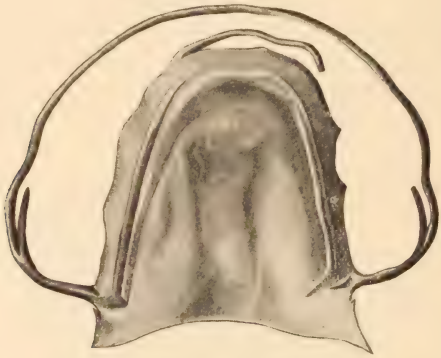
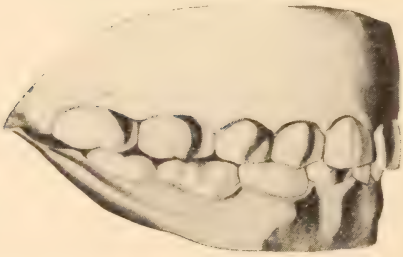


Fig. 9.



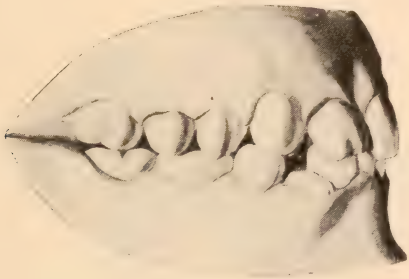
It is common practice, I believe, to use a wire in a continuous piece, allowing it to pass between the teeth and operate as clasps. It is better to make the clasps separately and attach the retaining wire to them as shown, as by this means either the clasp or the retaining wire can be bent without affecting the other.

With this appliance for jumping the bite in place, the closure was as seen in Fig. 9. The apparatus was worn from the middle of July until the following January, when the patient had grown so accustomed to the new bite that this was taken from her and a

retainer supplied, which was simply a plate for the roof of the mouth with the retaining wire exactly as in Fig. 8, the only difference between the two being the absence of the inclined plane.

The patient was under constant observation, and when the temporary molars were lost new clasps were fitted to the plate, passing behind the first permanent molars, which by this time had sufficiently erupted to be so utilized. It was pleasant to see the various teeth as they appeared become engaged by the retaining wire, and so led down to proper alignment within the arch. Fig. 10 is from models made within the last three weeks.*

Fig. 10.



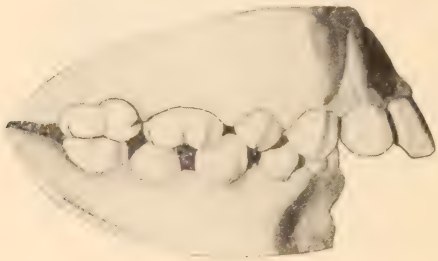
There is still some work to be done on this case, and this will be undertaken in the autumn. But, all the permanent teeth having erupted, it is safe to assert that the primary attempt has been successful. The great protrusion of the upper jaw has been corrected; the lower jaw has assumed a proper pose; the face has been beautified, and yet no tooth has been sacrificed. It is also worthy of mention that though this child has been constantly wearing plates for over two years, no speck of caries has attacked either temporary or permanent teeth. This may be attributed to the nature of the fixtures used. For the last three years my main reliance has been upon plates of iridio-platinum when plates were needed. These are strong, and alterations can be made in a few minutes at any visit, which is especially advantageous in many cases where crises occur unexpectedly, and perhaps at times when the office work is

*Fig. 10 erroneously makes the lateral incisor appear to be at an angle, whereas it is really still upright as seen in Fig. 9. Fig. 10 is introduced to show that the permanent cuspid and bicuspids have erupted in good alignment, without protruding the arch.—R. O.

overcrowded. But the chief advantage is from the prophylactic standpoint. All fixtures where possible, and certainly all of this class of retainers, are removable. The patient is therefore instructed to remove the retainer before eating, and to cleanse it and the teeth before returning it to the mouth. Moreover, the retainer is to be boiled in soda and water daily.

The above, gentlemen, is the record of a successful effort at expansion and early interference, and you have seen the appearance of the mouth at the age of thirteen. Let us contrast it with the mouth of Case B as it came to me when nearly fifteen years of age. The extent of the protrusion is seen in Fig. 11.

Fig. 11.



I will also ask those who may take part in the discussion to compare Fig. 11 with Fig. 1, and to observe how nearly the second permanent molars have taken the place of the first, which were removed; and if any can explain what was gained by the extraction I should be glad to hear his argument, as I have failed to find any rational excuse for this method, either from the study of this particular case or that of a number of others that have come under my observation.

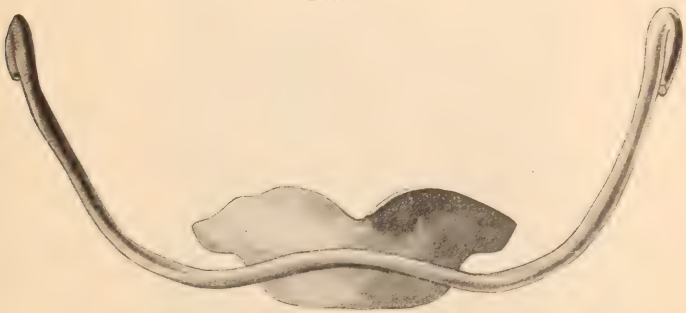
The treatment of this case was along the same lines as were followed with Case A. The variations in the treatment, however, made necessary as the conditions developed, will be instructive, arguing as they do that no binding rules may be laid down for the management of any case in orthodontia. These two cases certainly seemed similar, yet they differed greatly in certain particulars of treatment, due in part to the difference in the ages of the patients.

Once more we find the alveolar process involved seriously in the

protrusion, and consequently the same style of skull-cap was used; in this instance made of light tan-colored leather, and the first bit is shown in Fig. 12. It is upon the same principle as the bit Fig. 5, but here it engages four teeth instead of two. It extends high enough to include the process in the movement of the teeth.

All went well with this case until about the end of the eighth week, when it was observed that the incisors upon the right side were moving more rapidly than those upon the left. It should be explained here that while it might seem that the work would be facilitated by the removal of the temporary cuspids, it would be hazardous to extract them. They are preferably left in so that their roots may aid in moving the undeveloped cuspids backward, and it was upon this theory that the cuspids had been retained in this

Fig. 12.



instance. But when it was observed that the teeth were moving irregularly it was at once suspected that the permanent cuspids might not be in their proper positions. An X-ray photograph was taken for me by Dr. Wm. J. Morton, and this disclosed the fact that both cuspids were developing within the arch (Fig. 13).

With this knowledge the skull-cap was temporarily abandoned, and a fixture was designed to bring the arch into a symmetrical curve again. By the time this was made and placed in position the cuspid on the right side had slightly protruded through the gum, appearing within the arch. Fig. 14 shows the condition at that time. We here observe that the left incisors are bulging outward, while on the right side the tip of the approaching cuspid is shown.

In undertaking to work from within it was essential not to disturb the second permanent molars, which were to serve as final

anchorage for the retainer; moreover, both teeth were very short, so that at that time neither would have held a clasp. A band of pure gold was fitted to the second permanent molar on the right side, this being accomplished by relying upon a plaster model of the tooth and carving away the gum at the back. A similar band was made for the bicuspid, and these were united by stout pieces of clasp gold on palatal and buccal sides, so that the fixture should be sufficiently rigid to enable me to utilize the two teeth for anchorage as though they were one six-rooted tooth. The fixture was further

Fig. 13.

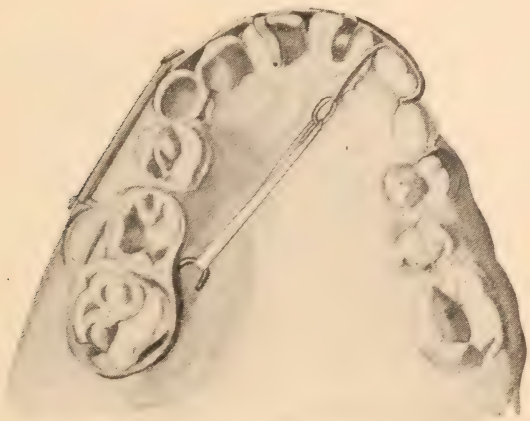
reinforced on the buccal side by a bow-like extension which had upon it a hook. This bow was used chiefly because I wished the hook to be high up, that the traction of the rubber should be in proper direction to prevent elongation of the incisors. The hook alone might have served this purpose, but a single arm extending up so high might have irritated the tissues of the cheek. Moreover, by erecting this arch I more certainly secured rigidity. In conjunction with this a T was used, the palatal arm passing between the central and lateral incisors on the left side. The two parts of this fixture, together with the elastics, are well shown in Fig. 14; and in passing from this fixture I will call attention to the approaching bicuspids on the left side, which are seen to be coming in within the arch and malposed, and this in spite of the extraction of

the first permanent molar, which would theoretically have given these teeth abundance of room.

The arch was restored to a symmetrical form by this means very quickly,—I think within two weeks. The temporary cuspid had been retained during this period, but it was then removed to give room for the advancing cuspid. The skull-cap was resumed, but, the process having been sufficiently bent inward, or nearly so, a different bit was used, one similar to Fig. 6.

As in the first case, here also the external asymmetry demanded that we should jump the bite, and after retracting the upper arch this was undertaken; the plate used here being of iridio-platinum, but the inclined plane was placed only in the incisive region.

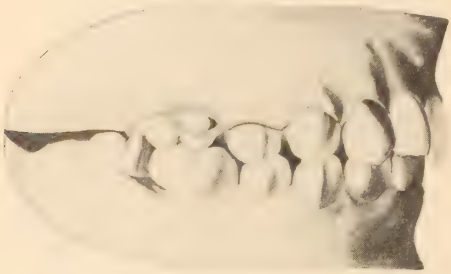
Fig. 14.



After wearing this for a few months the new habit apparently had been inculcated, and the fixture was abandoned for the retaining plate. But again the age of the patient affected the treatment. In the first instance the bite-jumping apparatus when taken away was taken away from the child finally, whereas in the second, when the simpler retainer was supplied, the patient was instructed to wear the retainer in the daytime and the bite-jumping plate at night; and this was done for three months longer, when it was abandoned for the retainer only. This precaution was observed because with the older child the abnormal habit of closure having continued longer, would be more difficult to break up.

The present condition is shown in Fig. 15, which was drawn from models made two weeks ago. This shows an apparently completed case, but had the drawing been made from the opposite side it would be seen that the permanent cuspid is still missing, so that a gap appears. In this mouth development of the teeth has been very slow, and this tooth especially is very tardy. As the cuspid on the opposite side had become fully developed while this was not yet piercing the gum, I probed for it last autumn and found it buried at a great depth, and I feared that it would there remain. I therefore concluded to attempt to induce its eruption by operation. At the first operation, after cocainizing the gum by cataphoresis, I used a circular trephine knife of large diameter, making an incision

Fig. 15.



down to the tooth, and then dissected away the tissue which covered it. Thus the tooth was disclosed, but at a depth of fully a quarter of an inch, which is deeper than it sounds to be. This wound was kept open with aseptic packings, which were retained in place by the retaining plate which covered it. These dressings were continued for about ten days, and the parts were then left to themselves. The irritation thus set up caused the eruption of the tooth to proceed, but eventually the gum closed over it again, healing completely. The tooth, however, had come down considerably. A second operation was performed, more tissue being removed this time, so that a considerable portion of the tooth was disclosed; the packings were used for a time, and then the retainer was cut away to allow the approach of the tooth, which has been continuous though slow. An examination of the model will show that the tooth is now fairly through the gum, but erupting far within the

arch. There will be abundant room, however, to get it into place this winter.

Before dismissing this case I wish to make reference to the advantage of the metal plates in accomplishing the minor details of the regulation. Thus the bicuspid on the right side was moved back to give room for the approaching cuspid by merely soldering to the plate such a spring of wire as would be used in Dr. Jackson's method. By thus making room for the cuspid it was pleasant to see this tooth, which was at first coming in somewhat twisted, right itself, so that no special attention was given to it. Again with other springs the bicuspids on the opposite side were forced outward into correct position and occlusion. Such spring wires are easily soldered to the plate, and as easily removed. In many simple cases the plate which I utilize in this manner for the regulation serves as the final retainer. Again I have to report that, using the same prophylactic precautions, not the least sign of caries has appeared in this mouth, Case B, all the teeth being in place except the approaching cuspid, and none disfigured by even the tiniest gold filling.

The chief purposes of this paper may be summarized as follows:

First. That by early interference and expansion in cases of protrusion the upper jaw may be made large enough to receive the unerupted teeth, thus in the end not only attaining correct occlusion and beautified external symmetry, but retaining all the dental organs. If such a case has been reported before it has escaped my notice.

Second. The theory of removing the first permanent molars in cases of upper protrusion, with the idea that the jaws will fall back, is a false one, attended by many evils, not the least of which is the fact that subsequent regulation is made doubly difficult because at the age when it would be attempted, in accordance with the plan of delay, such waiting having proven to be in vain, the second permanent molars, which must serve as anchorage, would be as little developed as were the first permanent molars when the latter were extracted. But the main difficulty with this plan is the unnecessary loss of two important organs, for it must be remembered that I am speaking of the extraction of perfectly sound teeth.

Third. That with the use of proper fixtures, made of pure metals where they enter the mouth, perfect oral prophylaxis may be as-

sured, even extensive regulation being possible without the least danger of inducing caries; and this is especially true if the fixtures are removable and can be boiled, and if such fixtures are not retained during meals, by which precaution it is certain that food cannot be lodged upon them.

Fourth. That the eruption of tardy teeth may be facilitated by operative measures.

In conclusion, I must express regret that I am unable to show the faces of these children. I have not in recent years made masks of the faces of my patients, because I have concluded that these plaster casts are cold and rigid, and do not adequately show the improvement effected. I prefer now to have profile photographs, which give more life-like representations. I have such photographs of these cases, and these show that both children have developed into beauties; indeed, the parents of the older girl are so pleased with her appearance that she has recently had her portrait made by one of our most prominent portrait painters. But I have promised in both these cases not to publish these photographs, and consequently I deem it to be my duty not to publicly exhibit them. These and others, however, may be seen at my office by any of my *confrères* who may honor me with a visit.

DISCUSSION.

THE PRESIDENT: Fifteen minutes will be allowed for the discussion of Dr. Ottolengui's paper. Will Dr. Guilford open the discussion?

DR. GUILFORD: I did not have the pleasure of listening to Dr. Ottolengui's paper this afternoon, because I was engaged in some other work, but he very kindly loaned it to me afterward, and in that way I gained a great deal of information in regard to what he had said.

Practical cases in orthodontia are always interesting. But after reading that paper I felt sorry that he had brought these cases here to explain to us, for the simple reason that I think he has made many mistakes.

In the first place, you will understand that he described two cases. Fig. 1 represents the mouth of a child ten years of age, in which the deciduous teeth are still in place; that is to say, three of them, as I understand it, the cuspid and the two deciduous molars on one side

and the same teeth on the opposite side; two permanent molars are in place, and the four permanent incisors. The dentist who had that case in hand extracted the two permanent molars, and when it came into Dr. Ottolengui's chair those permanent molars were of course missing, but the deciduous teeth were still in place.

Fig. 2 represents a case that came to him in his practice just as it is figured there. First I should say that they were cases of superior anterior protrusion.

The first thing he did in the case of Fig. 2 was to expand the arch. He expanded the arch with three deciduous teeth on one side and one on the other, and one permanent tooth on each side, if I am correct. After that he undertook to draw back or retract the three incisors, which he succeeded in doing; and then he went through a series of operations in order to bring the teeth entirely into line, and so forth. Now, it seems to me that in the one case he was not to blame, because a great deal of injury had been done before the case came into his hands by the extraction of the permanent first molars. In the second case I cannot understand why any one should be possessed with the desire to reduce that anterior protrusion at the tenth year of age. I cannot conceive of any good reason for a thing of that kind. It seems to me that no dentist would be warranted in undertaking first of all the lateral expansion of the arch when he had but six teeth to operate upon, four of which were deciduous.

Dr. Crouse: Why not expand at that age?

Dr. Guilford: The reason why I think it is unwise to expand at ten years of age is because we are interfering with nature. Nature should enlarge the arch so that the anterior teeth may be drawn back. Now, nature will expand that arch herself if not interfered with, as all arches are expanded in the natural course of growth. If that case had been allowed to remain until perhaps the fifteenth or sixteenth year, possibly the seventeenth, that arch would have been enlarged naturally, and this protrusion in front would probably not have been any greater. Why? The second molars would have come into place, but the deciduous molars would have been lost and the permanent bicuspids would have supplanted them; and, as the permanent bicuspids do not occupy as much space as the deciduous molars, he would have gained space in that way. There-

fore, I think that by attempting to expand the arch and undertaking a difficult piece of regulating at that age he did something that no one would be warranted in doing, because nature would do it unaided afterward, and because it involves a great deal of laborious work.

Now, after the arch was expanded, he said that he retracted those teeth by means of a little cap placed over the incisors, represented by Fig. 5. He made the cap of platinum, put the wire on the inside and soldered it there, and used it in connection with the headgear represented in Fig. 4 for retracting those teeth. Now, by placing that upon the teeth, in order to draw them back,—and I may say that an appliance constructed on that general principle is of course the only one that could be applied, because there was no opportunity to get an anchorage in the mouth to draw those teeth back,—and using the appliance for eight weeks, he says he discovered that all was not going well.

DR. OTTOLENGUI: You are getting into the wrong case now.

DR. GUILFORD: Didn't you say that?

DR. OTTOLENGUI: No; things went wrong in the other case, Fig. 14. Nothing ever went wrong in that case.

DR. GUILFORD: Fig. 14 represents the situation after he had used the appliance. He discovered what? He discovered that while the right central and lateral were coming in nicely, the left central and lateral were being pushed out. Is that correct, doctor?

DR. OTTOLENGUI: No; we might as well get that straight. You are mixing up the two cases. That occurred in the other case that was left to itself, and the off side was not being pushed out, but it was standing still. Therefore, as one side came in and the other did not, there was an apparent bulging, which made it necessary to stop that method of treatment. But do not get the two cases mixed.

DR. GUILFORD: He said that with the appliance represented by Fig. 5 he drew the incisors back, but he could not understand afterward why it was that two of them should come in nicely and the other two should not.

He also said in his paper that in using that appliance he preferred a solid bar soldered to the cap for various reasons. Now, it is my opinion that the reason why the teeth moved in nicely on one side and not on the other was that he did not use the appliance commonly

used for that purpose; that is to say, a separate cap for the incisor teeth, with a little pin upon it, and then a removable bar, which gives us a ball and socket motion; in other words, the traction bar designed by Dr. Angle.

Now, in using a solid bar and a cap, if there was more pressure upon one side than the other, it would affect the side that was most pressed upon, but if he used a separate bar and separate cap with ball and socket joint in front it would not matter whether there was more pressure upon one side than the other. It would all come upon the central point and the teeth would be brought back together, provided the cap covered the teeth, as it probably did. So that it seems to me he has made a mistake in not using a separate bar with a ball and socket joint.

Now, after that had gone on for some time, he discovered that a cuspid on the right side was just beginning to come through underneath the right deciduous cuspid, which you see there just inside of the arch. He retained the deciduous cuspid in place, and after a while, when it was lost, the permanent cuspid came into place, but on the other side he discovered that the teeth were not moving satisfactorily, and he had a Roentgen ray photograph taken, which revealed the fact that the cuspid teeth on both sides were not in their proper positions; that is, they were not ready to come through at that time, and that changed his method of treatment. Now, it seems to me that if that photograph was to be taken it would have been better to take it in the beginning, in order to ascertain whether those cuspid teeth were nearly ready to erupt.

Now, what was the result? The facts revealed by the photograph compelled him to change the course of operation. That is to say, after he had gotten the majority of the teeth in place he wanted that cuspid in place, and to get it there he drilled through the tissues one-quarter of an inch in depth, down to the permanent cuspid; and as it did not then erupt he performed a second operation, and in the course of time the cuspid came down most of the way into place.

This involved a very serious operation, or at least a very difficult one, which was not really called for. It occurs to me that it could all have been very greatly simplified. I have never attempted, and I do not know of any one else who has ever attempted, to draw back

the anterior teeth at ten years of age, because in doing so we would necessarily squeeze the deciduous cuspid between the teeth that were back of it and the teeth that were pressing upon it in front; and if the deciduous cuspid gave way either to the inside or to the outside, or got loose or came out, those teeth would be pressed together in such a way as to make it difficult for the permanent cuspid to come through. Therefore, it seems to me unwise to attempt to draw back teeth while the deciduous cuspids are still in place.

Now, what would have happened if he had waited until the patient was fifteen or sixteen years of age? At that time the permanent cuspids would have been in place, and in order to move the anterior teeth back he would only have had to sacrifice the first bicuspid on each side, draw back the cuspid teeth, and afterward the incisors, and in that way he would have gotten a very satisfactory result. Thus by a very simple operation at fifteen or sixteen years of age he would have accomplished that which he accomplished earlier, and would have done it with a great deal less trouble. Therefore, it seems to me, in the first place, that the attempt to operate at such an early age was a mistake, and the attempt to bring back those anterior teeth, pressing upon the frail teeth which were not very firmly implanted, like the deciduous cuspids, so near to the time of their loss was another mistake. And then the discovery that the permanent cuspids were not in the position in which they were expected to be, not as far down, and the two surgical operations that followed might have been prevented.

Now, another point. He said that after he got those superior teeth in place, the next thing was to jump the bite; and to do this he made an appliance similar to that represented in Fig. 8, a metallic plate with a ridge raised upon it in such a way and so placed in the upper jaw that when the lower teeth struck upon it they would slide forward and take the position which he wanted them to take, anterior to the place they formerly occupied. Now, that is one way of compelling the lower jaw to move forward, but there is another, very much simpler. I do not know whether Dr. Ottolengui knows of it or not. It was devised by Dr. Angle, to whom credit should be given. You will readily understand it when I tell you that it consists simply of a band encircling the molars, on the outside of

which there is a projection placed at an incline. There is a similar band placed upon one of the molars nearly opposite it in the lower jaw, which also has an inclined projection attached to it. They are placed in such relation to each other that when the jaw is closed these two slide over each other, throwing the jaw forward. They are so long that the child cannot possibly bite back of them, not even when the mouth is opened to its greatest extent. With an appliance of this kind the lower jaw can be thrown forward, jumping the bite, without the necessity of using any complicated appliance. I therefore think that if Dr. Ottolengui had waited until the child had become older, that is, the one upon whom he operated at ten years of age, he would have gotten the same result with a great deal more satisfaction to himself, with less labor, and with greater comfort to the child.

Dr. Rhein: I disagree with the last speaker in the preliminary remark that he made. I am very glad that Dr. Ottolengui presented these two cases in the beautiful way in which they are presented, and it is unfortunate that Dr. Guilford should have taken so much time in statements that are so misleading, because he has misconstrued the two cases so palpably. The cases are very familiar to me, because I happened to have three cases for treatment that were first cousins of the two cases represented here; and the family disposition is so similar that the cases approximate each other very considerably.

The point that I want to speak of is the criticism which Dr. Guilford makes about commencing this work early, on account of interference with nature. Now, unfortunately, the case which Dr. Guilford criticised did not come into Dr. Ottolengui's hands before the patient was thirteen or fourteen years old; I forget the exact age.

Dr. Ottolengui: Fifteen and a half.

Dr. Rhein: To show you how utterly mistaken Dr. Guilford has been, the case in which he met with no difficulty was the case which he commenced about the age of ten. My experience with the three cousins of these two cases was so similar that it may be well to show the marked similarity in the results.

Following the teachings that we have had on this subject, I commenced the regulation of one about the age of thirteen. Dr. Otto-

lengui and myself in comparing the cases have been struck with their marked similarity. Now, the results that I was able to obtain, following in the same line of work, did not begin to compare with the brother and sister of this patient, whose work was commenced respectively at eight and about ten years of age. The elder case consumed at least two years, while the other two were respectively finished inside of a year.

Now, the point from a physiological point of view, and from a scientific point of view, which I desire to illustrate is this: We were all impressed yesterday by the illustration which Professor Brophy gave us of the admirable and wonderful results he obtained in manipulating the bones at as early an age as possible. Gentlemen, the same thing meets us in this case. If you can take hold of any portion of the bones of the jaw at the earliest possible age, you are able to manipulate those bones with just as corresponding a degree of ease as there is difficulty as the patient becomes older.

Dr. Ottolengui: Nothing could have pleased me more than the remarks of Dr. Guilford, because in presenting these cases I hoped to mark a revolution. I hope in the future to be called a revolutionist, and of course revolutionists need time to acquire adherents. But I am astonished that Dr. Guilford should have had difficulty in understanding my intentions in these cases. Many of us labor at a disadvantage in listening to a paper, but Dr. Guilford had the paper, and not only read it once, but read it twice. Now, he says that the objection to my interfering in that first case is that by widening the arch I interfered with nature. How did I interfere with nature? In my paper I did not explain how I widened the arch, because, as Kipling would say, that is another story. That is a story that I am not yet ready to present; a method of widening arches which is not yet in print. But I will say that that jaw, Fig. 1, was widened by opening the suture, and the two maxillæ were moved bodily apart, one from the other, so that I did not in any sense of the word interfere with any future physiological enlargement of that jaw by any means. I simply made it wide enough to be able to bring the two centrals in between the laterals, and at the same time to allow for the accommodation of the occlusion of the lower jaw when it should be pushed into its forward and proper place, and the rest was left to nature. In fact, the jaw is larger at the present time, but so is the lower jaw.

Dr. Guilford said also that had I let it alone the jaw would have been wider and in better position for the regulation at the end of the period of delay. My purpose in showing these two cases was exactly to demonstrate that that is not true. Here are two cases, Figs. 1 and 2, the measurements of which are absolutely similar; and we find that in Fig. 11, at the age of fifteen and a half, which, God knows, is long enough to wait, the protrusion is a quarter longer. That is, suppose that the protrusion in Fig. 3 is represented by one, the protrusion in Fig. 11 would be represented by one and a quarter. Moreover, instead of having the great labor which has been pointed out to you, Fig. 1 was reduced to the position that you see in Fig. 9 between November and July, whereas Fig. 11 was reduced to the position seen in Fig. 14 in sixteen months. That is all we gained by waiting; that is, it took twice as long to do it.

The doctor said that by waiting all I would have been obliged to do would have been to *extract the two bicuspids.* Gentlemen, is that any interference with nature? Did the Almighty design that we should have one bicuspid on each side or two? I beg you to observe that in my Fig. 10 we have all of the teeth in position. We have lost nothing; neither the first permanent molar which was sacrificed from Fig. 2, nor the bicuspid which Dr. Guilford said would have facilitated our work if we had simply waited. So much for that.

Now, I wish to make an allusion to Fig. 13. The doctor tells me that I should have discovered the presence or whereabouts of those teeth by the X ray before I began the case. I am not quite certain that the X ray was in existence when I began that case. There was certainly no opportunity to use it at that time, and the X ray photograph which was eventually taken was one of the very first dental X ray photographs made by Dr. Morton. But, aside from that, I do not quite see that it was necessary for me to be able to guess in advance that those teeth would be within the arch, which is such a very unusual position.

Now, I wish to answer the argument that the particular instrument which I used for reducing this caused the ingoing of the teeth more rapidly on one side than on the other. I think I have done forty or fifty cases with this instrument, and I never had such an experience before. Consequently in the case where I did meet

the experience, when I found the anomaly of the cuspids being within the arch, I believed that it was because of the anomaly that the teeth moved irregularly, and not because of the fixture. I have had no trouble whatever with similar fixtures in any other case.

So far as the suggestion is concerned that the bite can be jumped by Dr. Angle's method,—which, however, I had associated in my mind with Dr. Goddard, but that is immaterial,—I am very much in doubt that that appliance would hold the teeth as well as the one which I used. For, remember that in one of the cases we were dealing with the first permanent molars at the age of ten and eleven, and in the other we were dealing with the second permanent molars, equally unerupted, at the age of fifteen or sixteen, and there is not room enough at the back for any such projections as are described when you realize that in the occlusion the condyles covered by the gum-tissues come in contact. There was no elevation of the posterior portion of the tooth above the gum.

All that I desire to say in conclusion is that these two are not the only cases where I have moved the four incisors in prior to the appearance of the bicuspids, and at Fig. 13 is the only case where I have had any difficulty whatever with the cuspids; and you will observe that they were abnormal, and we would have had difficulty with them in any event.

Now, lastly, I am accused of doing a terrible thing, a thing, however, which I thought I was going to receive a great deal of credit for, which shows you how one may expect praise and not get it. I am told that I had no right to cut down upon that cuspid and release it from its encysting sac. Well, I do not believe it ever would have erupted in any other way, and the lady would have gone through life with a gap on that side of her mouth, while now she will have a cuspid there. And, gentlemen, if I perform an operation and achieve my object, I fail to see why I have done anything detrimental to my patient.

SECTION IX.—Continued.

Results that Follow the Extraction of Permanent Teeth.

PAPER BY E. A. BOGUE, OF THE SECTION.

NOTWITHSTANDING the elaborate devices for crowning roots and building bridges over vacancies in the human mouth, it still seems evident that a large proportion of practicing dentists are engaged in verifying the old dictionary definition of a dentist, "A man who pulls out teeth and puts in others." Certain others seem to find it necessary to extract teeth for purposes of regulation, and still others continue to extract for what they are pleased to term prophylactic reasons. These latter generally choose the first permanent molars as their victims, on the ground that at twelve or fourteen years of age these teeth are found to be excessively decayed, having received no more attention than the deciduous teeth, for which they are generally mistaken by the parents.

A few, dismayed by the havoc wrought by extracting the first molars, have tried to compromise by extracting some of the smaller bicuspid teeth, seeking to minimize the evil wrought, but still clinging to extraction as the remedy *par excellence* for the dental surgeon to apply in a multitude of cases when he does not know what else to do.

As comparatively few of our craft have taken pains to preserve models, taken from the same patient year after year, knowledge of the results that follow extraction is generally rather vague. I shall take the liberty, therefore, of bringing to your attention some of the results of my own errors, as well as those of others, over which I have kept watch for many years, taking impressions of the same persons almost every year for from ten to twenty years past.

While this paper was in preparation, a professional friend remarked that some of these results might be good and some bad.

I stop here to say that it must necessarily depend upon the conscience, enlightenment, and powers of foresight of each individual operator to decide in each given instance what is for the best in that case; and while I may call attention to underlying principles, it will not be my province to attempt to apply those principles for any one else.

I have, for example, seen cases where the last molar teeth were the only ones in the mouth that touched, and the patient had reached adult life. Would not extraction be advisable? I do not know.

I have seen many cases of irregularity complicated with cleft palate. I have seen cases where the cusps seem to strike end to end. Some of these cases may seem to be exceptions to the principles thus far discovered. Whether they are or not we shall only know after the results of treatment appear. A well-known separationist, who believes that the mouth is a garden, and extracts and files accordingly, once criticised a model that I was exhibiting, saying that the man who had had charge of that mouth during early childhood and youth ought to be prosecuted for malpractice, for the extractions and fillings which had been done were abominable and worthy the severest reprehension. I pretended to defend as well as I could the action of the supposedly unknown operator, saying that he had evidently followed the teachings of his critic, but he reiterated more strongly than before that the result seemed that of ignorance and incapacity, if not of something worse. My reply to him finally was that he himself had cared for the young lady from her birth until she was married. A well-known New York dentist had then cared for her three years, and she then came to me one year, at which time I had procured the impressions, and we three must be responsible for her present condition. The fact is that not only do very few of us retain models year after year, so that we may know accurately what the results of our operations have been, but sometimes we do not retain the patients, and then surely we do not know.

For the sake of clearness I will give in the first place a list, probably not complete, of the results that follow extraction, and then will explain those results one after the other, lest there should be some to whom occasionally they might not be familiar.

First, then, it diminishes the size of the dental arches.

Second, it straightens some of the lines in those arches so that the arch in certain directions is scarcely perceptible. This straightening becomes very evident at times when one has tried ineffectually to place a rubber-dam on one of these straightened arches where the teeth lean forward.

Third, it diminishes the size of the arch of the palate.

FIG. 1.

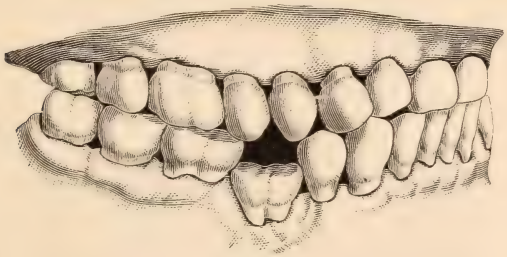


FIG. 2.

Figs. 1 and 2 show the height to which the permanent teeth grow above the level formerly occupied by the temporary teeth.

Fourth, it shortens the bite. That is, it causes the nose and chin to approximate more than would be normal had there been no extraction.

Fifth, it often causes separation of the upper incisor teeth.

Sixth, it causes exposure of the gums wherever the triturating or cutting ends of the teeth are not in contact.

Seventh, it prevents thorough mastication. First, because hard bits of food strike the gum where spaces exist, giving pain or incon-

venience; second, because the occluding surfaces of the teeth do not mesh.

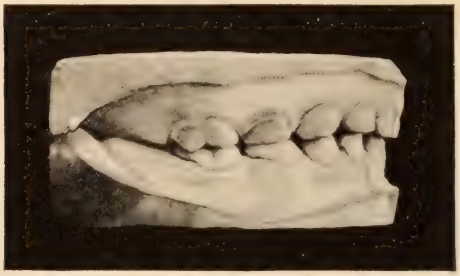
Eighth, it causes undue wearing down of the cusps of the teeth.

Ninth, it tends later on in life to fractures of the teeth at points of malocclusion.

FIG. 3A.

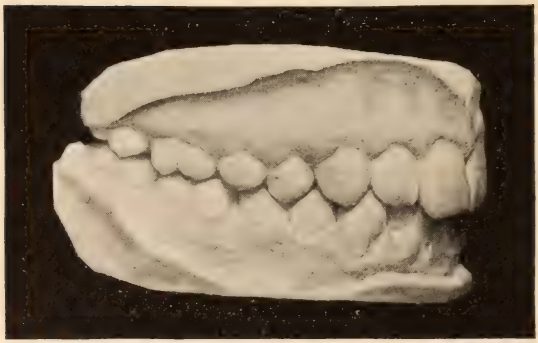
Shows teeth at three years of age (from August *Dental Cosmos*, 1889).

FIG. 3B.



Same mouth at five and one-half years.

FIG. 3C.



Same mouth at thirteen years. These three together show the direction in which growth has taken place.

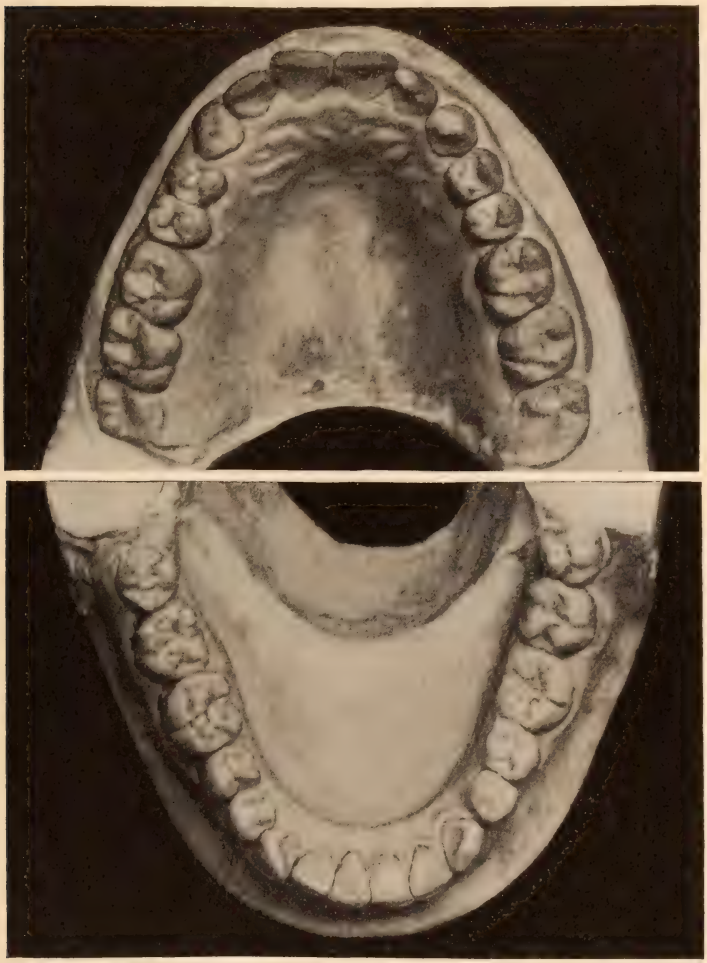
Tenth, it gives greater liability to the deposit of tartar.

Eleventh, it withdraws the normal support of the teeth, each

against the other, which originally constituted the arch, resulting in a weakening of the powers of mastication or crushing of hard food.

Twelfth, it causes as surely undue crowding between the teeth

FIG. 4A.



Shows a very perfect set, open, the curves of which are easily seen.

that remain and touch at their grinding edges as it gives space in the places left by extraction.

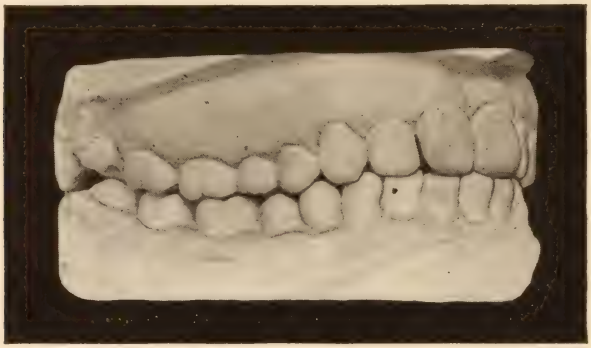
Thirteenth, it causes a rotation upon their own axes of the teeth.

which lean forward after extraction so that their contact with the adjoining teeth, if contact comes, is awkward, and is conducive to undue deposits both of food and tartar.

Fourteenth, it diminishes the needed room for the tongue, so that speech frequently becomes less distinct than it would otherwise have been; and sometimes it leaves so little room that the patient complains of being cramped in tongue movement.

Fifteenth, finally, if the extraction has been early in life the development of the palatine arch is so much interfered with that it becomes impossible to develop first-class vocalization. Patti would never have been heard of had she lost her first permanent molars at the age of eleven or twelve.

Fig. 4B.



Same set closed; curve from before backward particularly clear.

Now, to review individually and very shortly these fifteen results, or rather fourteen, and the repetition of the third. First, as the child grows, and the dental arches enlarge, the alveoli expand mainly in two directions, from above down and from below upward. (See Figs. 1 and 2.)

Notice that the second temporary molars were caught between the developing first permanent molar and the first bicuspid, and retain the positions occupied in childhood.

Then from the front backward, the greatest increase being back of the deciduous teeth. This latter increase is well shown by placing the models of the temporary teeth of any child upon the models of the permanent teeth of the same child after it shall have grown up (Figs. 3A, 3B, 3C).

By looking carefully at the positions of the temporary teeth we find an arch which is a pretty good horseshoe; that is to say, fairly round from one end of the arch to the other, and pretty nearly a straight line from the front backward from the incisors to the farther end of the molars. If all the dental organs, temporary and permanent, are faithfully preserved to fulfill the functions of maturity, the second permanent molars developing upon the curve of that lower jaw, which has grown backward and upward beyond what it was when it was that of a baby, will be a little higher than the first permanent molars. Following the line of that upward curve, the crown of the second molar leans forward and pushes against the first permanent molar at the point where the enamel is thickest; and this is at the greatest tuberosity of the tooth (see Fig. 4B). The third molar, when it appears, regularly rises still higher up the curve of the lower jaw than the second molar, and leans against the second in exactly the same relative position that the second molar leans against the first, so if the teeth in the lower jaw are normally developed and normally placed they form six different arches, the first being from the ascending ramus around to the ascending ramus again (Fig. 4A).

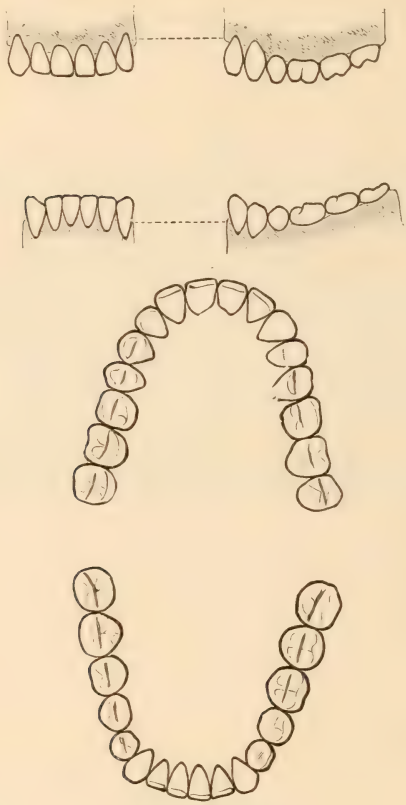
The second arch being a convexity looking upward of the six anterior teeth (Fig. 5).

The third and fourth being a convexity looking downward, thus making a concavity from the cuspid on each side back to the third molar (Fig. 4B).

The fifth and sixth being a slight curve of the molars outward toward the buccal side (see diagram) above. (Fig. 5.) If the upper jaw be normal it will also have corresponding curves, and if the upper teeth develop normally their cusps will articulate in a certain fixed manner with the cusps of the lower teeth; and, as the lower jaw is broader than the upper, the lower molars and bicuspids incline slightly inward toward the tongue, while the upper molars and bicuspids lean outwardly toward the buccal side, and thus bring their occlusal ends into contact with those of the lower teeth, which are first developed. In this way the largest superficial areas of these corrugated or cuspid surfaces are brought into contact, so that they may most effectively grind the food. If these arches be in any way disturbed, either by enlargement or diminution, the meshing of the cusps of the upper and lower teeth is as distinctly disturbed

as though an obstruction were put between two cog-wheels. If a tooth be extracted from one of these complicated dental arches of sixteen members each, it is like extracting cogs from one of those wheels. As nature abhors a vacuum, she seeks to fill up the space caused by extraction, and succeeds more or less well according to circumstances and the age at which the extraction took place. If the extraction take place at the age of fourteen or fifteen, or there-

FIG. 5.

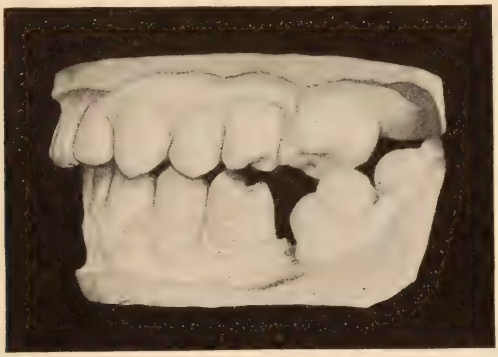


Curves of the arches.

abouts, there is always a tipping forward of the teeth next back of the space produced by extraction. There is also invariably more or less rotation on its axis of this posterior tooth. By just so much as this tooth leans forward its triturating surface is separated from

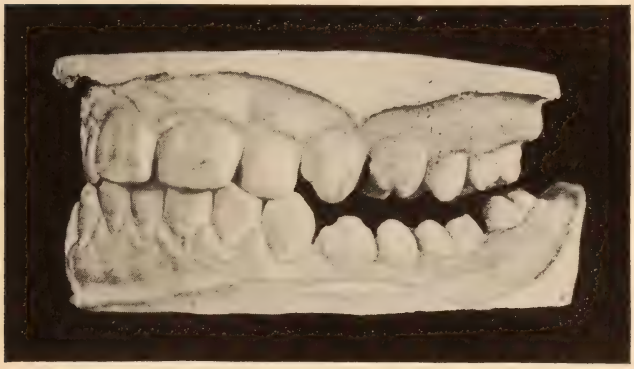
that of its opposite in the other jaw, and the area of mastication is thereby diminished from one-third to three-fourths; so that we have all seen the extraction of the four first molars result in the loss of not only those four, but of two-thirds of the triturating surfaces of the next four teeth back of these (Fig. 6).

FIG. 6.



Shows great tipping and dreadful malocclusion.

FIG. 7.

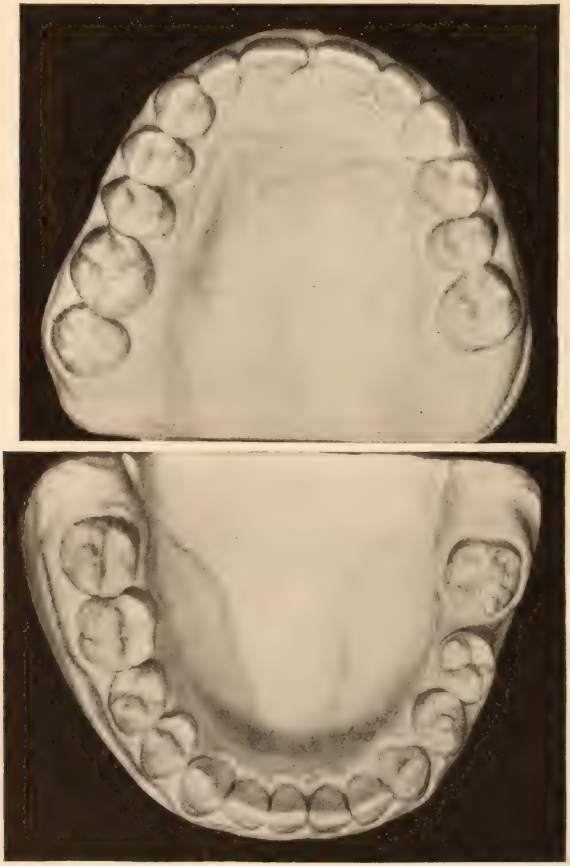


Shows a case where extraction left the child for a while with no masticating ground.

If the extraction took place at or before the twelfth year the second molar, pushed forward by the developing third molar (if there be one), will sometimes almost completely take the place of the extracted first molar. In that case, however, we sometimes are

obliged to put in artificial teeth for these poor little victims to chew upon while the temporary teeth are being shed and the second permanent molars developing; meantime the general condition of the

Fig. 8A.



Shows diminution in size of dental arch from extraction; also non-appearance of wisdom teeth (third molars) on one side; also marks of wear on upper incisors, especially marked.

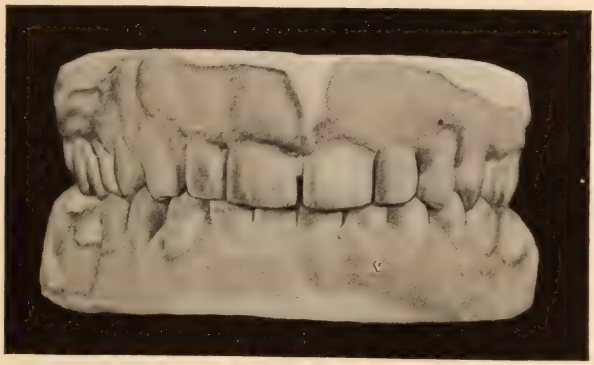
patient, owing to inability to masticate food and the constant irritation caused by striking the incisor teeth together, is apt to be very seriously disturbed (Fig. 7).

Granting that these years of development have been safely passed,

FIG. 8B.

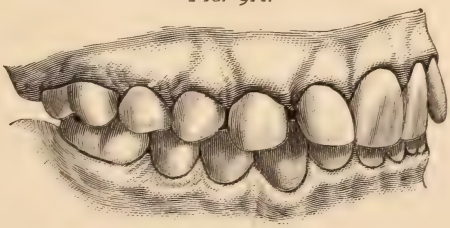
Shows faulty articulation, shortening of the bite, so that the lower incisors are largely hidden from view; and straightening of the lines so that the curves shown in Fig. 4 do not exist.

FIG. 8C.



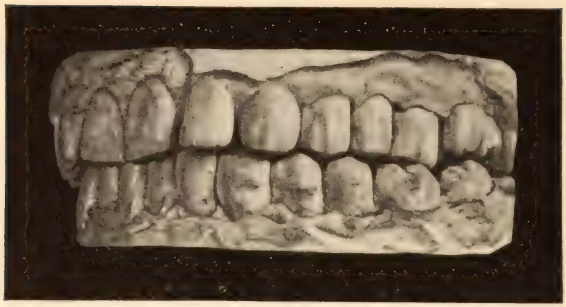
Front view; shows shortened bite, straightened lines, and the upper incisors being separated by the occlusion against them of the lower incisors.

FIG. 9A.



Shows a mouth from which the second molars were extracted in June, 1886, hoping to prevent approximal decay.

FIG. 9B.



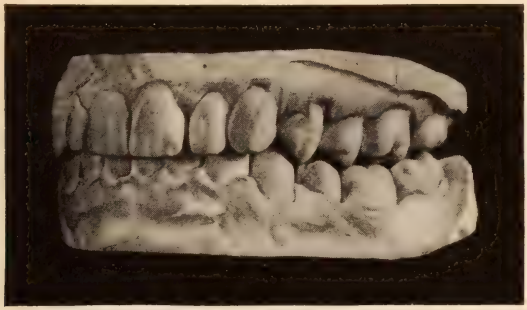
Same mouth in 1899; decay constant, fractures occurring from the tremendous pressure of the bite, which is not supported by the curved lines of nature, but has only the straightened lines resulting from the mutilation of extraction.

FIG. 10A

A most successful result after extraction of first permanent molars, showing, nevertheless, though not quite to the same degree, all the bad features of the two preceding cases.

and that the second permanent molars have as nearly as possible taken the place of the first permanent molars, and that the regularity of the teeth is so perfect that no one but a dentist, and an observing one at that, could possibly detect that a tooth had ever been lost, we then come to the second result mentioned above,—namely, the straightening of the lines of the dental arches. (See

Fig. 10B.

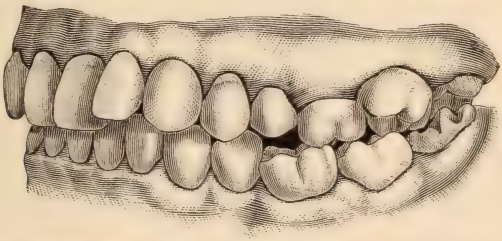


Same mouth closed, bite shortened, curves straightened, tartar depositing.

Figs. 8A, 8B, and 8C, Figs. 9A, 9B, and Figs. 10A and 10B.) The curves so visible in Figs. 4A and 4B are conspicuously absent in Figs. 8, 9, and 10.

When we look at the jaw of the child, with its twenty teeth, we find that the lines of occlusion from the central incisors back to the

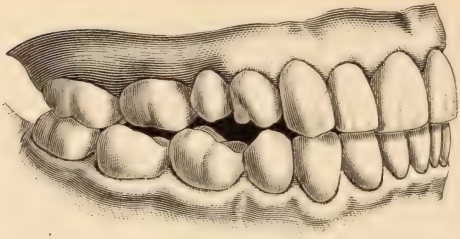
Fig. 11.



Shows an almost perfect set of teeth, excepting for the failure to erupt of the first left lower bicuspid. This failure to erupt produced the irregularity shown.

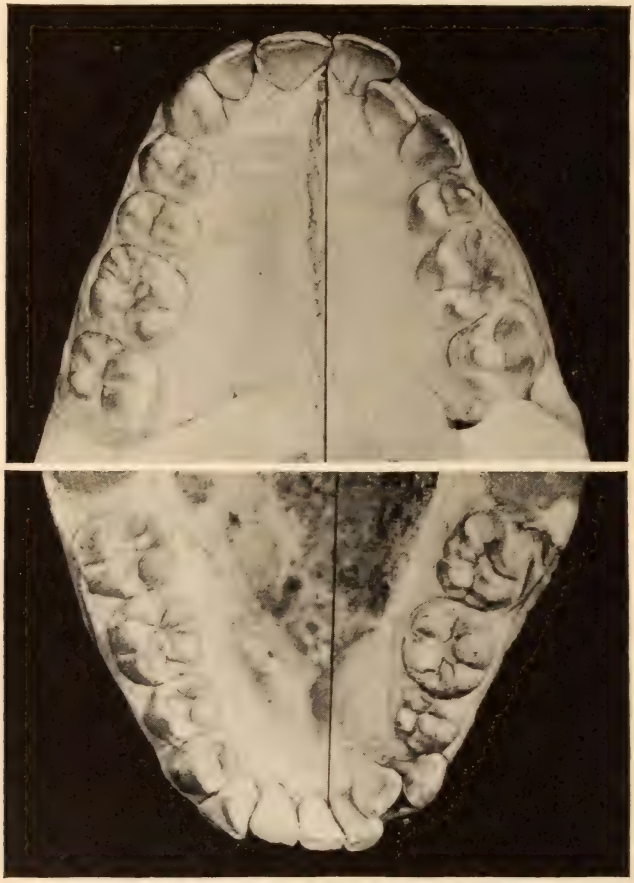
last molars vary but little from straight lines. (See Figs. 3A and 3B.) But these twenty teeth are for the use of that child during its infancy and up to about the tenth year of its age, and are adapted to the mastication of the soft food which constitutes the child's

FIG. 12.



Shows a mouth where the right lower first bicuspid was extracted at thirteen years of age, with almost exactly the same results as are seen in the preceding case, No. 11.

FIG. 13A.



Shows loss, five years ago, of upper and lower bicuspid on left side, causing great crowding of the teeth on the same side. Line from center of incisors backward shows great diminution in size of the mouth on the side where the extraction was practiced, lessening of the vault of the palate, flattening of the arches of the teeth on that side, so that the tongue has less room than on the other side, evidencing how extracting to make room diminishes the room and leaves greater irregularity than where extraction was not practiced.

nourishment; but these teeth and these lines are no better adapted to the necessities of adult life than the druggist's spatula and marble slab are to take the place of the mortar and pestle when he needs to do heavy work. So, until the osseous frame and the muscular development have reached a point where strong mastication of hard, rough, fibrous food is necessary, these feebler masticators are enough. The human animal does not reach its maturity before eighteen or nineteen years of age,—perhaps not then,—and teeth arranged to meet each other in nearly straight lines are not well calculated to do heavy work.

In the eruption of the permanent teeth the pressure of development is from the last tooth forward toward the cuspids both above and below, while the force of the lips draws backward toward the cuspids all incisor teeth above and below. The upper and lower

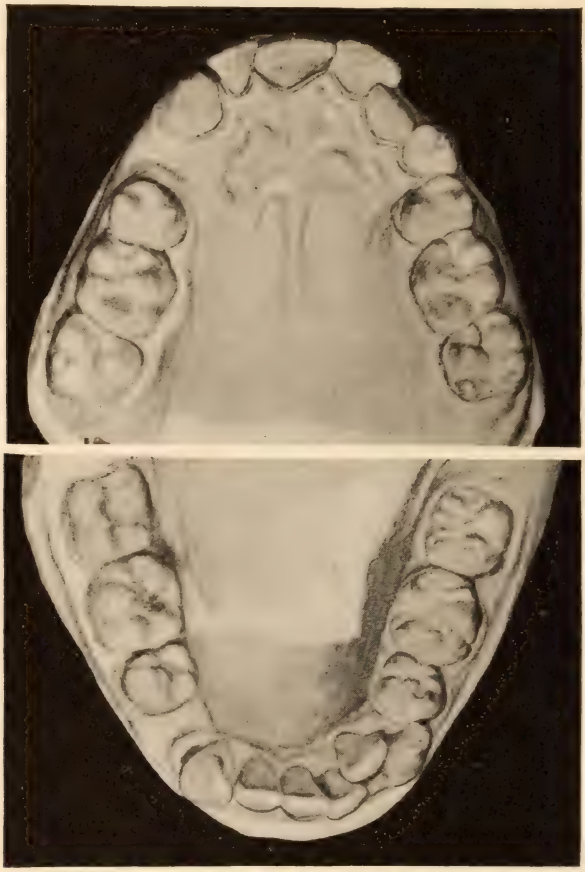
Fig. 13B.

Side view of Fig. 13A, emphasizing the above conditions.

cuspids therefore may be regarded as being the most nearly fixed points of any among the movable occupants of the mouth. In illustration of the operation of this fixed law of development, and that nature's effort to repair damage is always exerted along these lines, I present for your consideration the drawings of two mouths, one of which has lost the right lower bicuspid by extraction, the other the left lower bicuspid by failure to develop. The results are the same. (Figs. 11 and 12.)

Incidentally, let me call attention to the fact that the size of the dental arches being diminished by the width of one member in each of these cases gives that much less room for the free movements of the tongue, and to the critical observer that side of the face in each

Fig. 13C.



Shows how a dentist, being called upon, imagined he must do something, and so mutilated the poor boy still further by extracting two more good teeth from the other side.

of these cases was noticeably smaller than the other. As illustrating this fact particularly, I present the drawing of a model made quite lately of a mouth from which two teeth on one side only were

extracted about five years ago. The face is noticeably twisted, the speech is thickened very perceptibly, and marked irregularity and crowding exist on the side where extraction was practiced. Needless to say, mastication is seriously interfered with. Having con-

Fig. 14A.

Shows the narrowed mouth, protruding upper jaw and teeth, and lower jaw to correspond.

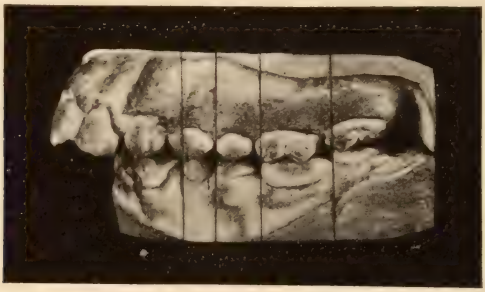
sulted a number of dentists, the patient placed himself in the hands of some one, to me unknown, who evidently thought that as he was called in he had better do something, so he extracted two more teeth (Figs. 13A, 13B, and 13C).

To illustrate still further the results of extracting even a bicuspid, I present six photographs of models of the same person taken at intervals of several years (Figs. 14A, 14B, 14C, 14D, 14E, and 14F).

These models show, first, the mouth open and closed as it was before anything was done; second, before and after the extraction of the two upper bicuspids; third, after successful efforts at spreading the arch and regulating had been made; and, fourth, a few years later, when the teeth are supposed to have acquired the positions that they are to retain.

This case lost, as you will perceive, the first bicuspid from each side above. The gentleman who regulated the case was justly proud of his results, which are far better than those usually attained under similar circumstances. He was surprised, however, when I

Fig. 14B.



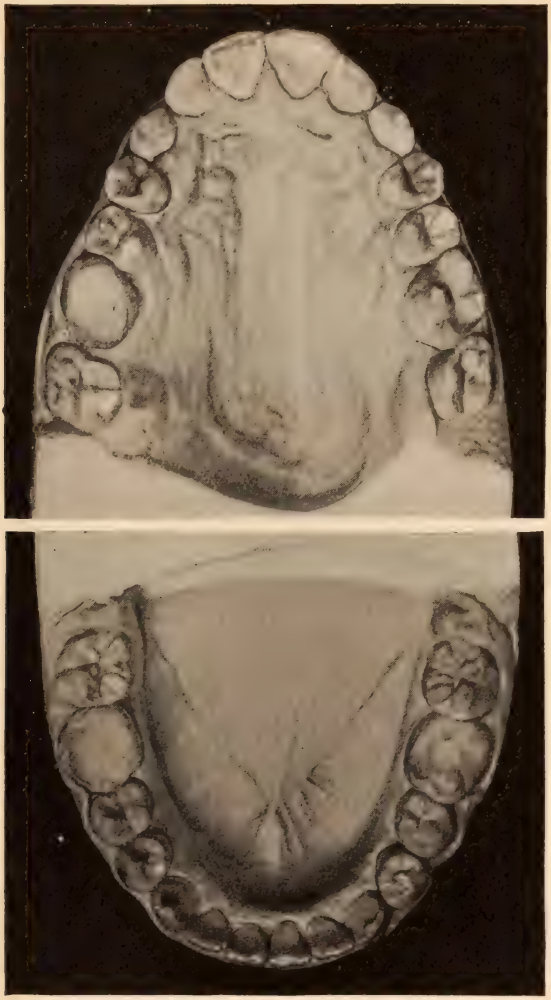
Same mouth closed, lines indicating the relative positions of upper and lower teeth.

called his attention to the fact that in the second models the second permanent molars had perceptibly advanced over the lower first permanent molars, and that the upper second bicuspid, toward which he supposed he had drawn the six front teeth, had advanced one-half the width of the lower bicuspid, while the upper cuspid remained in its position relative to the lower teeth, almost exactly where it was.

The third models show the second upper bicuspid standing exactly where the first bicuspid, which was extracted formerly, stood in its position relative to the lower teeth. The first permanent molar has followed it forward and covers a portion of the lower first permanent molar and second bicuspid, while the second

permanent molar above, touching as it does the upper first permanent molar, has moved forward just the width of the first bicuspid

FIG. 14C.

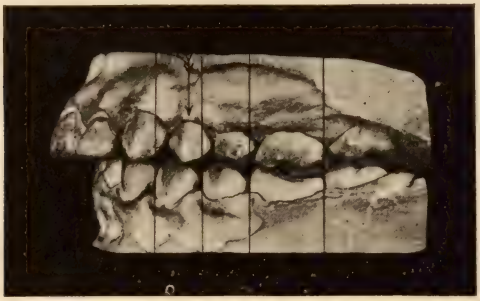


Shows some expansion of the arches and also the extraction of the first upper bicuspid, which appears in the plaster model.

which was extracted. Now, then, so far as the grinding teeth are concerned, what has been gained? Nothing at all, but we have

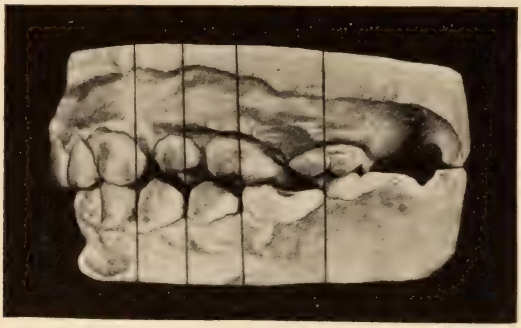
lost for life the more perfect occlusion and intermeshing of all the grinding teeth of this mouth. The only exception to this is in the case of the lower molars, in which fillings have been inserted which mesh as well as the teeth did before. To the casual observer every-

Fig. 14D.



Side view of same, movement of upper molars distinctly shown, being both outward and forward.

Fig. 14E.



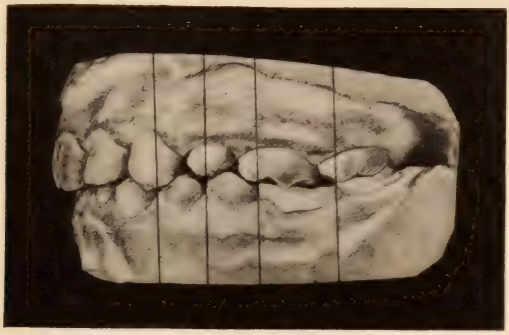
Shows so great movement forward of the upper molars and bicuspid as to have placed the second bicuspid in the position formerly occupied by the first bicuspid, which was extracted, while the upper molars have advanced so much as to entirely fill the gap.

The upper cuspids having spread apart laterally, the four incisors have been drawn down to touch them, and so the prognathous condition of the upper jaw has been corrected, while the cuspid teeth occupy almost the same positions relative to the lower teeth that they did before; that is, they have not gone backward much, if any.

thing is regular. To the critical observer, who makes models that we can examine from behind as well as in front, it is seen that mastication must henceforward be a stamping process, and not a trituration; and while it is true that the patient and the physician may not

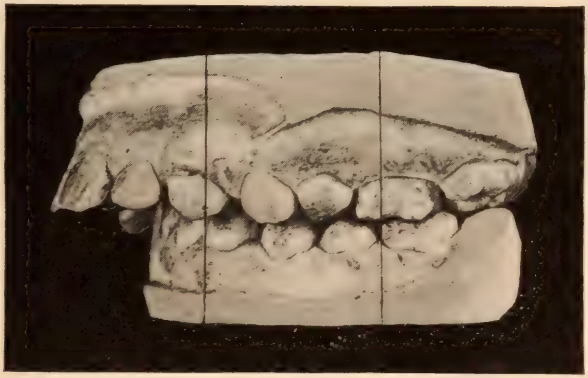
know what it is that causes ill health, who can say positively what the impairment of this function of mastication and insalivation may result in? Certain it is that the organs destined to prepare the food for assimilation have been very seriously impaired. But you may

FIG. 14F.



Shows the same mouth after several years; the lines on these cases serve to mark any movement backward or forward.

FIG. 15A.



Shows the prognathous condition of the upper jaw when the patient was about twelve years of age.

ask, and the gentleman who did the regulating did ask, How happens it that the upper incisors are placed in their proper position and remain so? The reply is very simple. The upper cuspids have been spread apart laterally, so that the arch formed by the cuspids and incisors has become a flattened arch instead of a high

arch, and the cuspids and incisors now occupy the positions in which they belong. Furthermore, the bite is visibly shortened, and very

FIG. 15B.

Shows the same case as it was two months later, without extraction, plus the eruption of the second molars, and as it remains to-day, nearly seven years later.

FIG. 16A.

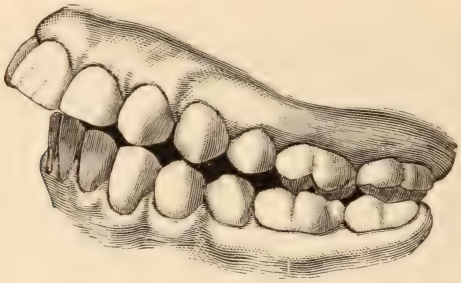
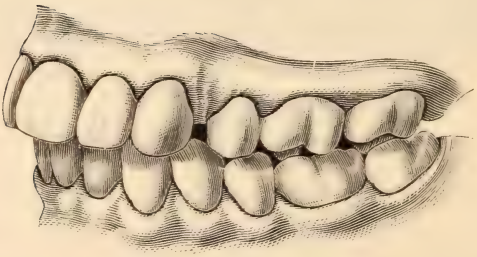


FIG. 16B.



The figures represent a case shown in the August *Dental Cosmos*, 1889, involving the extraction of the two upper first bicuspids.

considerably, so that a good portion of the lower incisors is no longer to be seen when the teeth are closed.

Now, to illustrate what can be done without extraction I present two other models coming from the same operator (Figs. 15A and 15B), the one taken nearly eight years ago, the other within a few weeks.

This case has been entirely regulated without extraction, and the regulation was accomplished in two months; so that the teeth have been in their present position for several years,—not far from seven, I believe. It will be seen that the upper molars in this case have actually been drawn back. The admirable results are before you.

Fig. 16C.

The same mouth, ten years later, 1899, the results being in no sense better than those in Fig. 14.

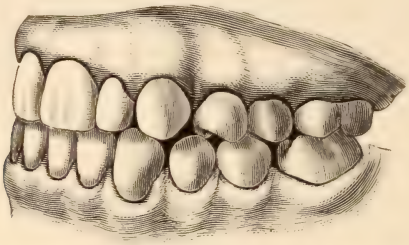
A third case, which I present, also had the two first upper bicuspids removed and the upper front teeth drawn downward, spreading the cuspids somewhat (Figs. 16A, 16B, and 16C).

This regulation took place when the patient was fourteen years of age. The second model of this mouth was taken six years later. The lower incisors at that time leaned considerably forward, the lower cuspids were no longer upright; the first bicuspid leans so far forward that the tuberosity of the second bicuspid is below the tuberosity of the first, and almost the same condition exists between the molar and second bicuspid. The lower arch is distinctly made narrower, and yet it will be remembered that nothing has been ex-

tracted from the lower jaw, nor has any tooth been filed. The movement that we see in this case is entirely due to the change in occlusion which has taken place since removing the natural support from in front of the second bicuspid above. We cannot see that the six upper front teeth have gone backward, but we do see that the upper back teeth have come forward; and in their coming forward the change in the lines of contact has been such that the upper teeth have driven the lower teeth forward also, and in that forward movement has occurred a distinct shortening of the bite to the extent seen here.

The third model of this mouth has been made within a few weeks, and is ten years later than the second model. A number of frac-

Fig. 17.



Represents a case of extraction of the second molars, and shows the same straightened lines, weakened bite, and shortened bite shown in Figs. 8, 9, and 10.

tures have been sustained by the teeth at various points, owing to the malocclusion produced by those unfortunate extractions seventeen years ago.

The next diagram (Fig. 17) shows a straightening of the horizontal lines of the dental arches from in front backward, so that the concavity of the line of the lower molars and the convexity of the line of upper molars is scarcely, if at all, perceptible, restoring very much the style of occlusion of the temporary teeth.

Not only are these lines from front backward straightened by even the most successful results that can occur after extraction, but the curve from the center of the mouth between the incisor teeth back to the third molars is straightened and shortened so that the extraction of an upper and a lower tooth on one side of the mouth and not upon the other gives that side of the tongue less room, because the teeth tip toward the center of the mouth in the process

of straightening the lines to such an extent as to noticeably deform the countenance (Fig. 13A).

Further than to indicate these changes it is not worth while at this moment to enlarge, as each gentleman who chooses to preserve his models for a few years will see for himself these results more clearly than I could show them in the time at our disposal.

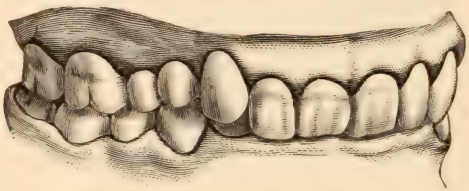
As these dental arches are straightened the diminution in the arch of the palate occurs, sometimes by failure to develop, sometimes by absorption taking place during nature's effort at repair, so that resonance of voice and distinctness of speech are forever gone. I have had the sorry experience put upon me of being consulted professionally by quite a number of young persons, especially ladies, whose aspirations as vocalists had drawn them to Paris, and to the most famous vocal teachers in that capital; and every one, without exception, who lost teeth previous to the time at which cultivation of the voice ought to have begun failed when they came to make their *début* as singers, notwithstanding the years which they had put to cultivation of the voice. On the other hand, I have been consulted by a few of the most noted vocalists, and, beyond some slight irregularities of the anterior teeth, the development of the permanent teeth had not been interfered with, either by extraction during their youth or by serious irregularities in any of the cases that I have seen or known about, notwithstanding the fact that two of them in their adult life came for artificial substitutes.

With this diminution of the arches and straightening of their curves comes (fourth) a shortening of the bite that causes an approximation of the nose and chin more than is normal. Ten years ago I undertook to express this idea in a discussion with a professional friend, who presented for our inspection some models of the same mouth before and after the extraction of certain teeth, and asked me if the models after extraction did not show a lengthening of the bite considerably greater than what existed before extraction. I replied, "Yes, the bite is longer since extraction, but the bite is not as long as it would normally have been had the extraction not been practiced;" and to give an ocular demonstration of the truth of this assertion I presented, and now present again, the diagram of a mouth in which certain of the deciduous teeth still remain. (See Figs. 1 and 2.) You can see the level at which there were baby teeth on a straight line, while the level to which the permanent teeth

have arisen in their curve upward and backward since the advent of adult life is before your eyes and needs no argumentation. Object lessons speak loudly.

You will perhaps permit me to refer very briefly to two or three cases in practice. First, that of a lady, perhaps thirty years of age, who, having lost her first permanent molars, had the bite so shortened that when the teeth were shut the lower incisors were not at all visible, but were engaged in biting the upper gums just back of the upper incisors to such an extent that the mouth was constantly sore and giving pain. The molars and bicuspids were all wedged apart, and approximal fillings were put in that knuckled, by this means preserving permanently in a measure the spaces that had been gained by wedging. This process lengthened the bite sufficiently to free the gums from the contact of the lower incisors, and has remained an efficient remedy for twenty years (Fig. 18).

Fig. 18.



Shows, as a result of extracting the first permanent molars, the bite so shortened that the lower incisors wounded the roof of the mouth whenever the teeth were shut. Wedging the teeth apart and inserting contour fillings has given relief for twenty years past by opening the bite enough to clear the gum. (From August *Dental Cosmos*, 1889.)

The second case is myself, having had my lower incisors three times shortened because of impingement upon the edge of the upper. About a dozen or fifteen years ago I put a large wedge between the first bicuspid on the right and the first molar, in the space formerly occupied by the second bicuspid, extracted when I was about twenty years of age. I wedged these two teeth about a month for the purpose of restoring the contact in the arch which had been broken so many years before by the extraction of that one tooth. I raised the bite by this wedge to such a degree that the incisors no longer touched. I put in a brace, which I still wear, and the occlusion has never since been strong enough to annoy me.

My third case is that of an assistant, who had a wedge placed between two lower molars one summer. There was no time to fill

the tooth. The wedge was retained and renewed daily. The assistant crossed the ocean. Upon arriving in Paris the upper molars were found to be separated sufficiently for four or five thicknesses of tape to be passed between them. This movement was caused by the action of the lower cusps upon the upper.

Following upon this shortening of the bite, which means closing the jaws closer together because there is not enough tooth-substance to hold them apart, comes the impinging of the lower incisors upon and against the tuberosity of the upper incisors. This leads much more often than is generally supposed to the fifth result mentioned above,—namely, the separation of the upper incisor teeth. These

Fig. 19.

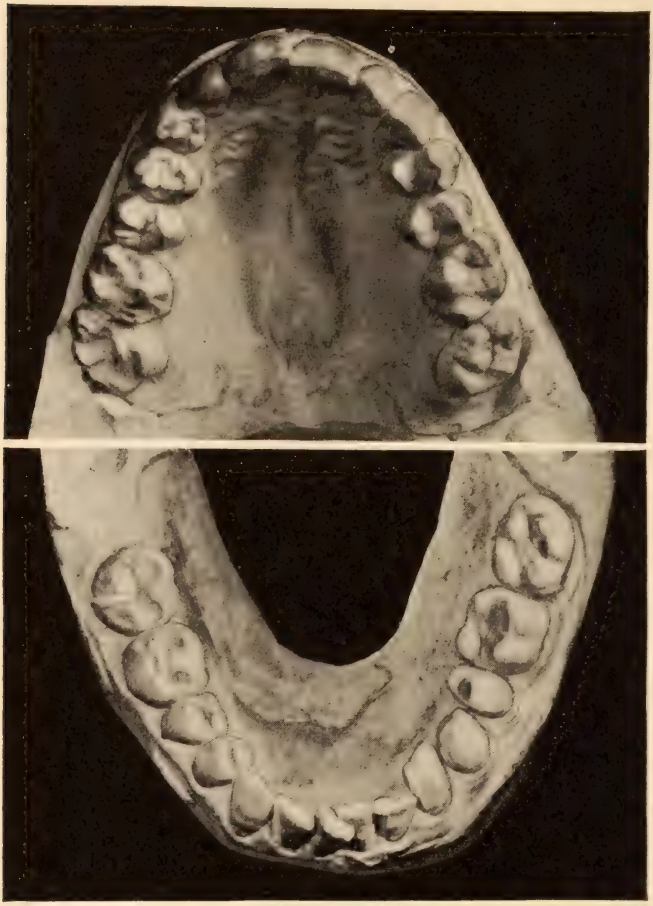
Shows the upper central incisors driven apart by the undue pressure of the lower incisors brought into contact with the upper teeth by the extraction of four molars.

incisors are frequently driven forward and apart in middle life, and sometimes earlier; so that unsightly spaces are formed, and sometimes so large that the upper incisors project to such a degree that closure of the lips is difficult, if not impossible. I show in illustration Fig. 19, the case of a young lady only about eighteen years of age, whose incisors are largely separated from this cause.

With this separation of teeth from one another, whether it be separation of incisors or of molars, comes the sixth result mentioned,—namely, exposure of the gums to the contact of hard or fibrous particles of food in the act of mastication. We who watch over our patients from a professional, that is, an ethical, standpoint will notice that this exposure of gums leads to my seventh result, the prevention of thorough mastication; firstly, because of the pain

or discomfort which these hard and fibrous bits occasion, and, secondly, because the occluding surfaces of upper and lower grind-

FIG. 20A.



Shows the lower incisors driven inward and the circumference of the mouth diminished by the extraction of the first permanent molars. Decay is constantly recurring from the crowded condition of the teeth that have been repeatedly filed apart to get room after the failure to make room by extracting. Certain localities also, being inaccessible to the brush, are very prone to the deposition of tartar.

ing teeth do not mesh, and therefore render thorough trituration of the food impossible. We are sometimes called a nation of dyspep-

tics, and the fault is frequently ascribed to bad cookery. Perhaps it might be as well to ascribe some of it to our bad dentistry, which, instead of honestly and faithfully conserving all of nature's powers, often, through indisposition to exert personal effort, or from lack of careful consideration, destroys masticating power, and so sacrifices the best interests of the patient for the sake of a fee that ought to put to confusion him who receives it.

My eighth result mentioned the wearing down of cusps. In those cases where the happiest results are reached that are ever seen after extraction I have seen greater wear of the cusps at twenty or twenty-five years of age than ought to be found at fifty or sixty. Figs. 8, 9, and 10 show wear, separation of teeth, shortening of the bite, fracture of teeth, diminution of the dental arches and the arches of the palate, a loss of dignity of expression, and yet they are all successful cases, so-called. These results are shown plainly enough to those of us who will take the trouble to make and study plaster models of our patients' mouths. These same students of the plaster models will also see my ninth result, fractures of the teeth at points of malocclusion. These breakages only occur later in life, when the changes that are constantly taking place by the movements, wear, decay, and deterioration of the dental organs have progressed beyond the point at which they were when the extractions took place. We all have seen, and some of us have wondered why teeth so frequently break of themselves, perhaps when the patient is eating mush and milk. I especially call attention to this one cause of these breakages, as it seems to be the cause of the larger proportion of them.

My tenth result from extraction is the greater liability to the deposit of tartar. This arises sometimes from the lower incisor teeth being caused to incline inward instead of outward, as they ought; in which case it is made difficult, if not impossible, to effectually guard against the deposit of tartar or of food (Fig. 20A).

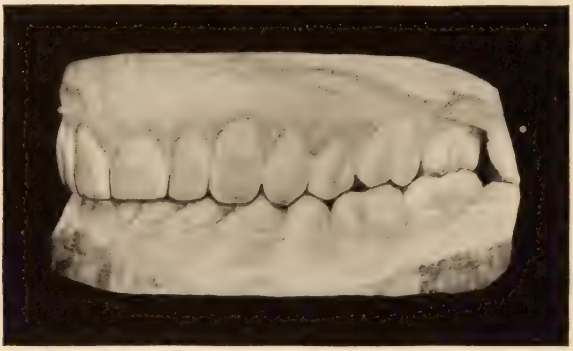
The back teeth after extraction almost always incline forward toward the cuspids, which leaves a triangular space or spaces, generally very difficult to clean. We must notice therefore the greater liability to a profound deposit of tartar on teeth where the horizontal arches have been disturbed by extraction or other cause. Clinical observation shows that a deposit of tartar is much more frequent and goes deeper, even to the forming of calcic abscess on

the sides of teeth, abutting upon the region or space left by the extraction of a tooth.

Approximation of grinding-surfaces favors such deposit; not only by forming a nidus of tranquillity for the oral fluids, but by preventing that trituration which tends to cleanse the teeth of food or other deposit.

Once more referring to my own case, the extraction of the second upper bicuspid led to a deposit of tartar between the lateral incisor and the cuspid which, twenty years after the time of extraction, became so troublesome that one or two calcic abscesses formed. It

Fig. 20B.



Shows the shortened bite of the same mouth, forming an occlusion very liable to fractures.

was because of this condition that I inserted the wedge alluded to earlier in this paper, wearing it a month and driving the teeth of the upper arch tightly together, where they have since been retained by the brace which I wear. From that time to this I have not been troubled by the further deposition of tartar on this lateral incisor.

The eleventh result is the withdrawal of the normal support of the teeth constituting the arch, with the consequent destruction of a portion of the support of the normal socket.

My twelfth result of extraction may seem anomalous,—an undue crowding where teeth touch each other while leaving spaces between those teeth where the occlusion of the antagonizing teeth permits spaces to occur. It is generally supposed, and I think almost always said to the patient, that extraction is done to make room. So far from making room, room is diminished, and what room remains is

crowded; not only by teeth touching too forcibly,—where they touch at all,—but by their inclining inwardly toward the tongue. If a few years after extracting teeth we could take impressions of the same mouths we should invariably find that room had been lost, not made. (See Figs. 8, 9, 10, 13, 18.)

The thirteenth effect is the rotation on their axes of teeth posterior to the extraction, which always gives a bad occluding surface to the antagonizing tooth in the opposite jaw.

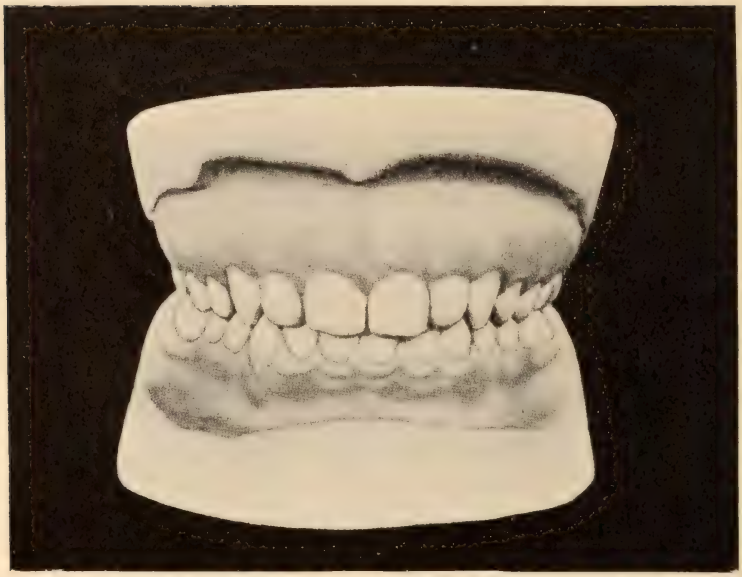
My fourteenth result has been substantially covered in the twelfth, namely, the diminution of room for the tongue, and the frequent production of thickness or lisping in the speech subsequent thereto.

Lastly and finally, my fifteenth result has to do with those changes that have been before alluded to, that effectually destroy the power of supreme vocalization by diminishing the boundary lines in which the vocal organs must necessarily act, so that the clergyman, the actor, the singer, the forensic lawyer are, in their greatest perfection, all impossible where the hand of the extractor has been at work.

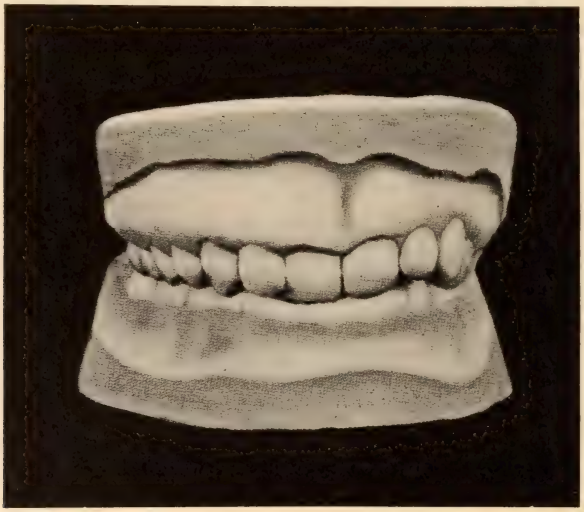
I am sure that if my professional brethren will study the results of extraction as I have been compelled to study them, from the failures that have resulted through extraction, their practices can certainly be made so conservative that they will never extract unless the good to be gained will surely and greatly overbalance the injury that is sure to be done. A very slight examination of the *drawings of models* published to illustrate Dr. Mitchell's paper in the *Dental Cosmos* for June, 1899, shows nearly all these results as having occurred in his cases.

If the fillings required in the number of years that have elapsed since the extractions are so few, surely it shows that the structure of the teeth as a whole was so good that had the defective teeth been properly repaired with the skill which I know Dr. Mitchell to possess, the probabilities are that the masticating organs could all have been easily preserved and the patients been saved from the necessity of limping through their victuals for the rest of their lives.

Dr. Mitchell's Cases.

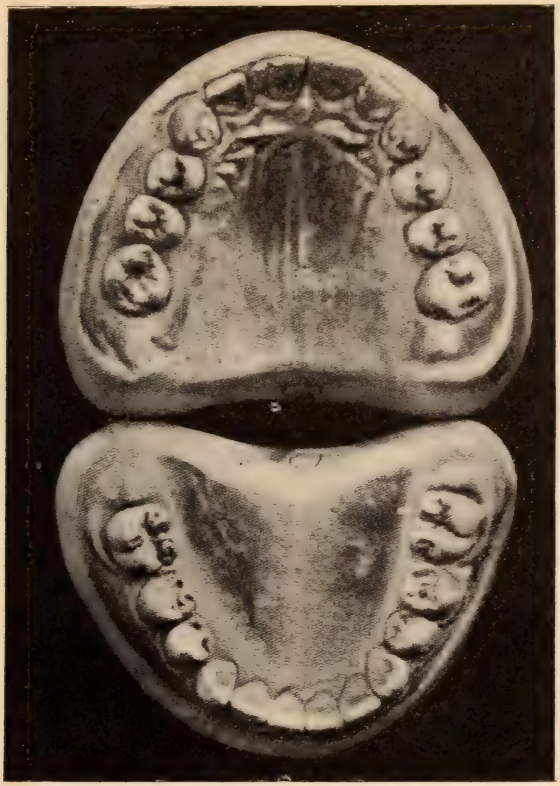


Shows a pretty good anterior appearance, excepting for the separation occurring between the central incisors.

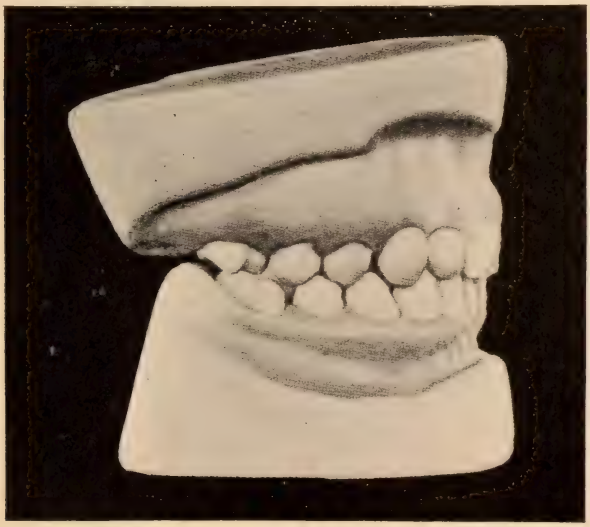


Dreadfully shortened bite, that will be augmented by any loss of substance from the dental arches, whether by filing, extracting, decay, or breakage.

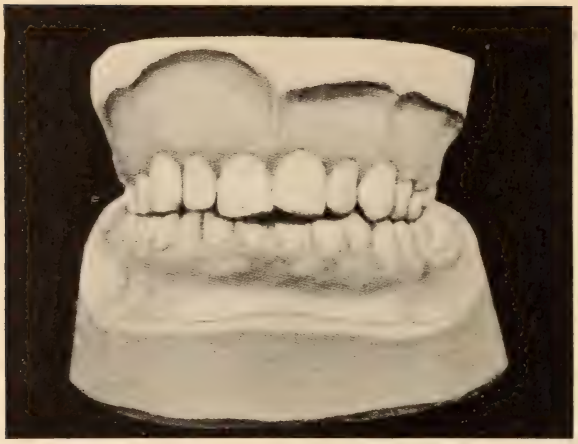
Biting the gums so as to endanger the loss of all the front teeth is possible.



Shows one of the best results that can be produced after extracting so large a portion of the natural masticating surface.

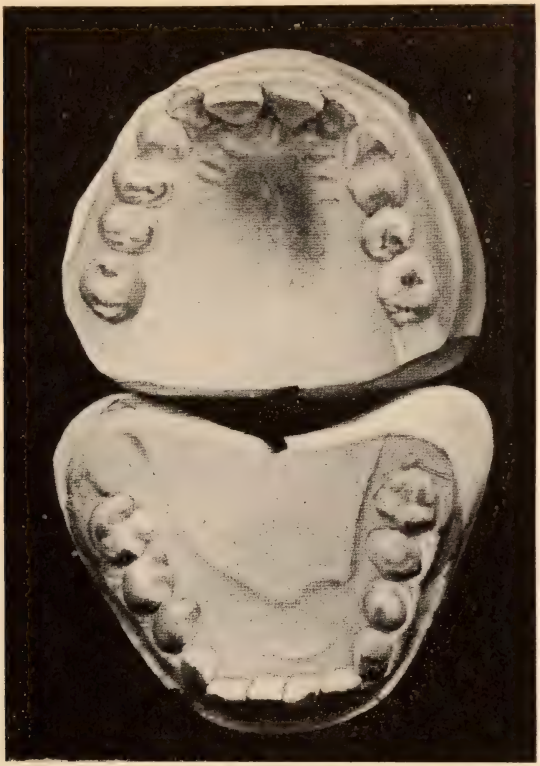


Shows the unfortunate loss of material with which mastication should be performed according to nature's laws.

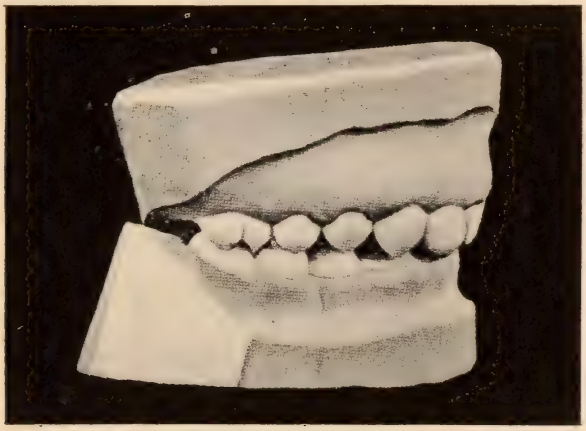


Shows a fairly good *appearance*, but shows the bite too short.
The consequences of a shortened bite, however brought about, are elsewhere described.

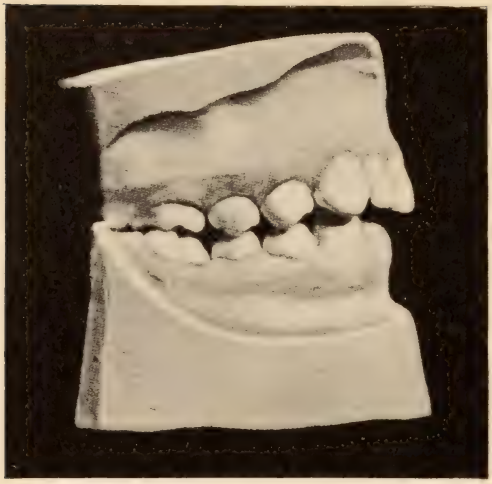
Shows irregularity, diminished room, decrease of masticating power, and loss of proper function, but the absence of the lower model precludes final judgment.

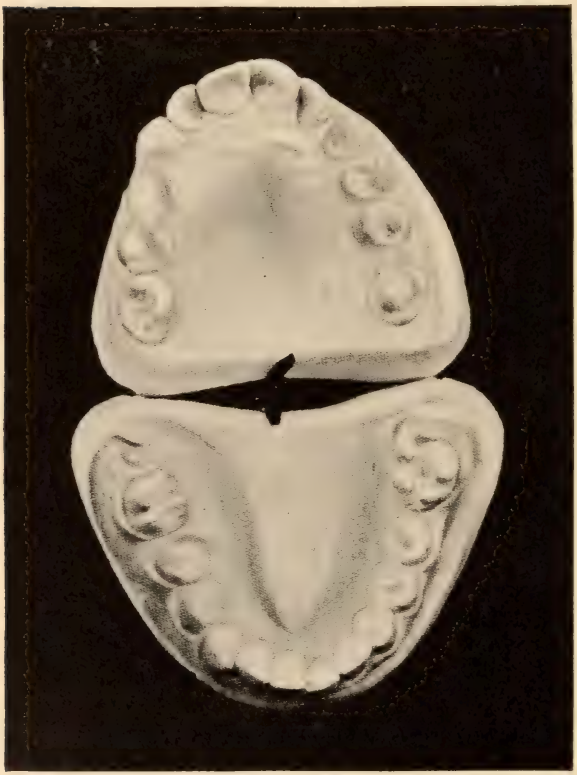


Shows great diminution of grinding surface. Marked irregularity of position, weak arches, and necessarily malocclusion.



Shows shortened bite, straightened arches, decrease of masticating surface not only measured by the loss of four teeth, but the additional loss from crushing of the cusps, and faulty triturating surfaces.





Shows diminution of arches, little room for tongue, impossibility of fine vocalization, and loss of dignity and masticating power.

It might be presumptuous in a private member of this body to bring before it views that are at variance with those generally held, were it not for certain experiences that have clearly demonstrated that the whole truth is not held by any one person.

A few years ago, having at one time three cases of prognathous upper jaw to treat, I sought counsel, not only from the published experiences of my professional brethren, but from the men themselves so far as I could reach them.

One of the most distinguished authors on the subject of orthodontia then said to me, "If you now have the good opinion of these three families, do not imperil it by undertaking to regulate those teeth, for you are sure to fail whatever you do." The same gentleman later said in public that after treating many cases he had about concluded that extraction was the best remedy for the worst cases of irregularity.

Another author who writes much on this same subject, and who advocates extraction all too often, once treated six cases of irregularity, and left them with retaining plates in the care of a fellow-practitioner.

Later on all six of these cases, together with the gentleman's written instructions, came into my hands. All of them were failures.

A third author, who has done most commendable work in gathering and collating statistics for our use, and has put an amount of time, labor, and money into his work that would appal most of us, has more than once declared that he did not believe that in cases of prognathous jaw the bite could be jumped. As I have a number of cases in which it *has* been done, and have one here to-day, it will be seen that this gentleman had not at that time seen all there is to see in this line.

A fourth authority, who has succeeded in accomplishing wonders in the matter of rendering presentable, nay almost beautiful, countenances that were so plain as almost to be repulsive, once said to me, "I have never studied the matter of occlusion of the teeth. My work has been for appearances, for beauty, and I am free to confess that you have gone far more deeply into matters pertaining to the actual utility of the teeth than I have."

A fifth authority has loaned me some of the models that I exhibit

here to-day, and he has given me permission to criticise as freely as I shall my own models, for, he says, "I no longer believe in extraction for regulating purposes as I once did."

These experiences must serve as my excuse for bringing these views, supported as they are by actual cases, before you on this occasion.

SECTION I.

Prosthetic Dentistry, Chemistry, and Metallurgy.

REPORT BY JOSEPH HEAD, CHAIRMAN OF THE SECTION.

AMONG the inventions worthy of consideration platinum solder deserves special mention. Such a solder, composed of thirty parts platinum and seventy parts gold, will melt considerably above the fusing point of ordinary continuous-gum body. It can be safely used to solder iridio-platinum clasps onto the plate before the body is fused, thus rendering partial sets of continuous-gum work much more generally feasible. Dr. W. V-B. Ames, of Chicago, is the gentleman who has given this to the profession.

In the light of the great interest recently shown in porcelain work, it is of value to know that an accurate instrument has been devised by Dr. L. F. Head, of Philadelphia, by which the beginner, using an electric furnace, can readily fuse porcelain with the accuracy of an expert. While testing a furnace that he had made he noticed that ten and one-half amperes of 110-volt current flowed through the furnace while it was cold, and that the current varied inversely with the temperature, so that when the fusing point was reached only five amperes were registered, clearly showing that each degree of temperature has a characteristic flow of current.

From these facts he concluded that, given a constant voltage, a beginner, by placing an ammeter in circuit with his furnace, could have a dial and pointer to designate when the porcelain was properly fused; for, having noted where the dial pointed when the

body was baked, if the voltage was constant the pointer thereafter resting at the same place would always indicate a similar degree of heat. If the voltage should vary, of course a voltmeter became necessary in addition.

There are two papers that the Section begs to present to the meeting: "Dental Prosthesis," by Dr. W. Warrington Evans, of Washington, and "Dies and Counter-Dies," by Dr. Robert H. Nones, of Philadelphia.

SECTION I.—Continued.

Dies and Counter-Dies.

PAPER BY ROBERT H. NONES, OF THE SECTION.

IN presenting this paper, it is not my intention to take up the different methods and metals used in making dies and counter-dies, but to confine it to the presentation of a successful method or using zinc for a die and lead for the counter-die. I claim that any plaster model can be fitted with a metal plate, from its zinc die, provided the die be properly made, in total contradiction to the generally accepted theory.

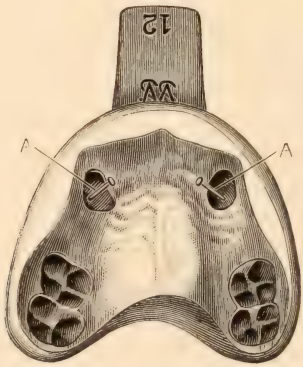
What is absolutely necessary in metal work is a good model, —that is, a properly shaped, hard one,—which will permit of the molding and fitting of the plate. This starting foundation is too frequently neglected, soft, ill-shaped models being used in the expectation of success, when failure is the certain result.

The majority of failures in prosthetic dentistry may be ascribed to this cause,—building upon weak foundations in the hope of recovering from them as the work proceeds.

The obtaining of a model with which we may expect to successfully carry through our work commences with the preparation of the impression. Granting a good one has been taken, it should be treated as follows: If of plaster, the parts if broken should be dried, carefully placed, and fastened in their proper positions immediately after taking, and not allowed to remain for several days before pouring the model, as there is always some change in plaster thus standing. A coating of very thin shellac varnish should then be applied as a stain, of such a consistence that it will be at once absorbed by the plaster, coloring it but leaving no film of the var-

nish (another mistake frequently met with). Any imperfections should be filled with wax after this varnishing; the shellac giving a better outline than the white plaster, as well as holding the wax in place. Carving of the impression, if desired, should also be done at this time, the color guiding as to the thickness removed; then re-varnish the carved parts. After this a coating of very thin sandarac varnish should be quickly applied, otherwise it will set and cake, leaving simply a gloss, not a heavy coating, and with rugæ, tooth imprints, etc., partly filled up. On a partial impression teeth standing alone should be strengthened by having ordinary pins placed in the impression (see Fig. 1). It is then ready for pouring the model.

FIG. 1.



A, Pins.

It is not necessary to varnish wax or modelling compound impressions, but a coating of very thin sandarac will produce a model with a smooth and much harder finish than one without it.

Combination varnishes—that is, stains and separators combined—do not work as well as shellac and sandarac separately. Oil, soap, etc., should never be used, especially oil, if success is to be expected, as hard plaster cannot be obtained when brought into contact with it.

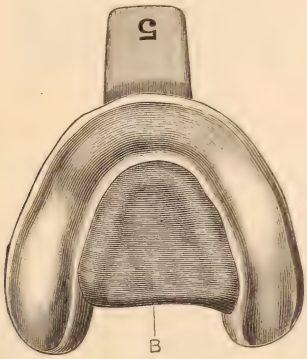
Before pouring, the impression may be dipped into water, the surplus water being thrown or blown off; this dipping will facilitate the flowing of the plaster.

The desired amount of water, without salt, should be placed in the plaster bowl, for which rubber is more desirable than porcelain, and the plaster—casting preferred by all means—slowly sprin-

kled into the water, allowing it to be absorbed until the desired quantity is taken up. Avoid stirring the mass until this has taken place, then by a few turns with a stiff plaster spatula, or what is better, an ordinary table knife, mix the mass. This should be accomplished quickly, as much stirring of the plaster will result in a soft rather than a hard model.

Starting from one condyle of the impression with a little plaster, carefully work it around to the other side, avoiding bubbles in teeth by working the plaster in with a wire or stick, adding plaster until the desired height is reached. (With this method, which I shall endeavor to explain, a very high model is not necessary.) It

FIG. 2.



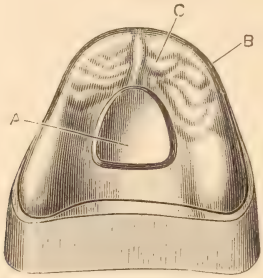
B, Wax.

should then be reversed on to a piece of window-glass, upon which some plaster has previously been poured, and sloped from the base toward the impression, making a tapering model with the base the largest part (as shown in drawings of models). Lower impressions should be filled across the center with wax (Fig. 2), the model built directly across (as shown in Figs. 5 and 6), and not semicircular in shape, as this is entirely too weak.

As soon as the plaster sets it may be removed from the glass and placed upon wood, base down, the wood absorbing the moisture, hardening the plaster quicker. After a few hours the model should be removed from the impression, when it will be found much easier to separate than if allowed to stand several days or weeks; the separating of a model from an impression is so well known to all of us that it needs no description. I would say, however, that I

avoid placing in water either modelling compound, wax, or plaster in order to separate, preferring dry heat for compound or wax, and the knife for plaster, as the water method will cause a marred, soft model. After shaping and doing any carving necessary the plate should be outlined, and the vacuum chamber, if used, made from

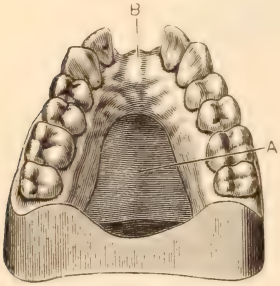
FIG. 3.



A, Vacuum chamber. B, Wax along ridge. C, Wax over rugæ.

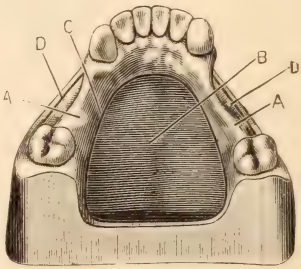
chamber metal and fastened in place with a little sticky wax (Fig. 3). This I consider a much easier and more certain method than any other, especially that of carving the vacuum chamber in the impression, which should be avoided for the reasons that it is not

FIG. 4.



A, Wax in center of model to prevent slipping of plate. B, Wax over rugæ.

FIG. 5.



A, Wax along ridge. B, Wax in center to prevent slipping of plate. C, Wax along inner edge of plate line. D, Wax along outer edge of plate line.

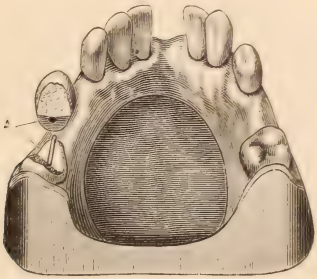
only more troublesome, but any alterations of its form or changes of its position, or removing or replacing while fitting the plate, are difficult, if not impossible.

All parts of the model, such as hard prominences, rugæ, narrow ridges, etc. (Fig. 3), liable to be defaced on the zinc die during

swaging should have a thin film of wax flowed over them, as well as over the outer and inner edges of the plate line on lower models, to prevent the plate cutting into the mouth along these parts. (Shown in Fig. 5.)

Lower as well as semicircular shaped uppers—that is, those not covering the center of the mouth—should have wax built across the model extending to within about an eighth of an inch of the plate line (Figs. 4 and 5), in order to prevent the slipping or sagging down of the plate during the swaging. The model should then receive a coating of thin sandarac varnish, leaving only a glaze. It is presumed that the model is dry by this time, as a moist model will not take the varnish. Teeth standing in such positions as to cause undercuts, making difficult molding, may be sawed half-way

Fig. 6.



A, Plaster tooth partly sawed through and snapped from model, leaving pin in position.

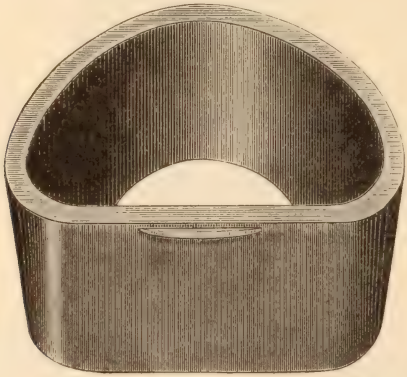
through with a fine jeweler's saw and snapped from the model (Fig. 6). This method is far preferable to trimming them off, as they can be replaced after the molding and the model be preserved for future use.

With these preparations the model is ready for molding. Marble-dust mixed with water is the molding material used in this method, as it has all the good qualities of other materials, combined with cleanliness and the ability to withstand drying out, which glycerin combinations will not. The marble-dust should be carefully sifted to cleanse it of foreign bodies and to break up any lumps, after which sufficient water may be added to make the dust pressed in a lump in the hand break, when broken, with a clean fracture. Resieving is again necessary to thoroughly mix and reduce to fineness.

The only molding ring, the one absolutely necessary in this method, and in which any model may be molded (I personally never having had to resort to any other in many years of laboratory practice) is the ordinary Bailey ring, or rather a modification of it, which I show here (Fig. 7).

The model is placed in the desired position as regards tilting, etc., the ring placed over it, with the base or larger opening down, and the sand sifted over and around it, carefully pressing with the thumbs until the ring is filled, when it may be packed hard with the palm of the hand. There is no necessity to use a hammer or mallet for this purpose. When packed trim off evenly with an ordinary

Fig. 7.



Molding Ring.

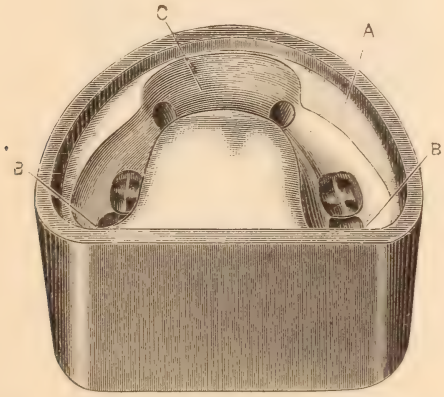
table knife, and remove the model from the sand either by drawing or tapping. In order to give sufficient thickness to the counter-die the ring should be raised by having sand packed around the model. This is only necessary, however, in very high models.

After obtaining a satisfactory mold the next step in obtaining a zinc die, from which a plaster model may be fitted with a metal plate, is the removing of the sand—using the knife for the purpose—about a half or three-quarters of an inch from the base of the ring. This forms a shoulder on the die, makes it easy to pour a counter readily handled while swaging, and, which is a more essential reason, it gives a thickness of metal which allows for the greatest shrinkage to take place in this base and not on the face of the die.

Molds of lowers should have the sand removed on an angle from the condyles toward the shoulder, to prevent an undercut and allow the counter to slide easily over. The sand should also be removed from in front of the lower front teeth in partial cases, as it strengthens the die, preventing the cracking or breaking of the teeth while swaging (Fig. 8).

The mold is now ready for drying, which is another very important procedure in this method. It should be placed over a gas stove or any suitable means for drying and thoroughly dried, or rather baked, after which and while still hot the molten zinc should

Fig. 8.

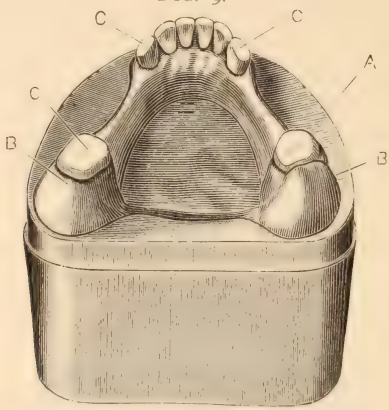


A, Showing sand removed to make shoulder on die. B, showing sand removed at condyles to prevent undercut on die. C, Showing sand removed at front of mold.

be slowly poured into it almost to the top of the ring. Then a similar ring, base down, should be placed upon the ring containing the mold, and the pouring of the metal continued until the joint between the two rings is reached, when it should be discontinued a few seconds to allow a slight cooling of the metal to prevent its flowing out between the two rings; then the pouring may be continued until midway or almost the top of the second ring is reached. The metal should never be run over the top, nor should the top ring be placed with the smaller opening down on the mold ring, as then the die could not be removed from the ring. If care is not used when starting to pour the metal the mold may be marred, and the plate would not fit at that point. This is frequently the cause of upper plates not fitting the model at one condyle, which is due

to the improper pouring of the metal at that particular point. After the metal has set, but before it becomes cold, which occurs in

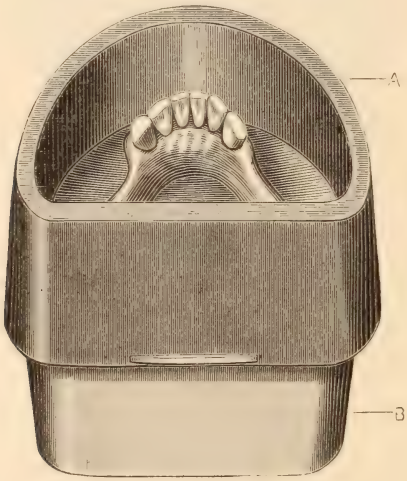
FIG. 9.



A, Shoulder. B, Condyles trimmed to prevent undercut. C, Teeth trimmed to aid in swaging.

a few moments, the die should be removed from the ring and any imperfections corrected.

FIG. 10.

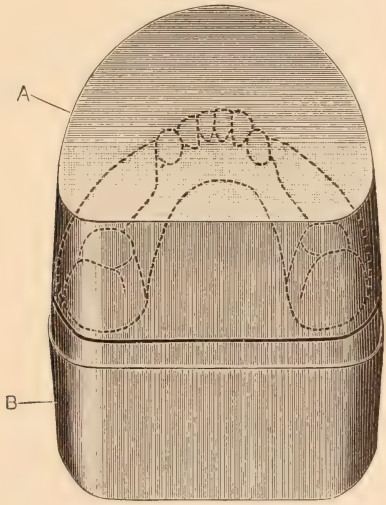


A, Ring B, Die.

In order to make swaging easier, the teeth should be cut off of dies of partial cases (Fig. 9). This trimming of the die or cutting

off of teeth can be accomplished while the die is hot almost as readily as the cutting of plaster.

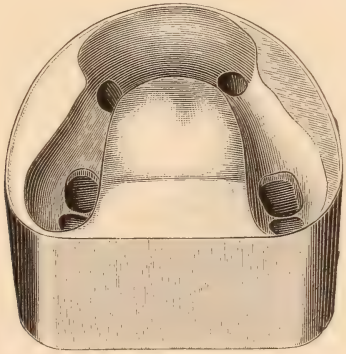
FIG. 11.



A, Counter-die. B, Die.

Never place the die in water to cool, as so cooled it is more readily cracked while swaging, and any attempt at trimming is very difficult.

FIG. 12.



Counter-die.

After obtaining a satisfactory die the ring in which the mold was originally made is placed over it (Fig. 10), the shoulder of which it

should fit, and upon it a counter-die of lead is poured quickly to prevent creases, almost but not quite to the top of the ring.

The die and counter are now completed, and should be allowed to cool without being placed in water.

My arguments that a plaster model may be fitted with a metal plate from a zinc die are that the mold while hot is of course expanded. By pouring the metal while in this expanded condition, allowance is made for the shrinkage of the zinc. The greatest shrinkage I believe to take place in the greatest mass of metal, which is the base of the die. But the most satisfactory of all reasons is that of years of successful practical demonstration.

SECTION I.—Continued.

Dental Prosthesis.

PAPER BY W. WARRINGTON EVANS, OF THE SECTION.

WHAT is meant by dental prosthesis? A question frequently asked not only by laymen, but by many dentists. The word dental we all know to be derived from the Latin noun "dens," a tooth, while the word prosthesis is of Greek origin, and signifies, according to modern dictionaries, "The addition of an artificial part to supply a defect of the body." Therefore the combined words indicating this "dental restoration" in the oral cavity would rather imply nearly all operations performed in the mouth by dentists, as specialties are branches of dental prosthesis. Although a fact, it is not generally so accepted. Nor does the writer desire so to consider it, owing to the severe criticisms from many operative dentists, who proclaim their ignorance and inability to cope with the subject through their indifference and slurring remarks, both at conventions and in private.

Why is it that crown- and bridge-work is excluded from this heading by them at conventions and placed under a separate caption? Is it because the theoretical dentist who wishes to fraternize with the new departure, and yet does not care to be supposed to associate with the old ancestral branch of "mechanical dentistry," adopts this new daughter of iniquity because there seems to be more lucre in its manipulation?

Be this as it may, we do not care here to discuss nomenclature,—"A rose by any other name," you know. It is time the dental educators gave a little more practical attention to this branch of their profession, which has been sadly neglected or misrepresented.

Statistics will show that the demand for skilled prosthetic work is vastly on the increase, in spite of the rapid strides made in our profession. We have now some fifty or sixty dental colleges, many of them elegantly and efficiently equipped in this department. Inventors and manufacturers have placed at our disposal every convenient appliance that could be desired to accomplish the most delicate and artistic work, and yet the percentage of skilled workmen is smaller than it was thirty years ago, when the "mechanical dentist" made all his own tools and materials for his laboratory, even to the teeth.

This is a curious contradiction, but the human mind is a curious combination: the more we have the more we want, and the method of teaching must be radically changed if we wish to correct the evil. Brain work is good, but it will never make the practical dentist without a thorough and practical training in the mechanical art,—labor and plenty of it. The reason for the large percentage of skilled dentists of thirty and forty years ago was because few men undertook the profession who were not born mechanics, jewelers, instrument-makers, etc. To-day about one-half who take it up are considered unfit for any other pursuit. They dislike labor, and think dentistry offers an easy way to make a living. And many of the colleges are running them through more upon theoretical or mental training than practical ability; or what practical training they get is by young, inexperienced men who have had no more advantage of learning the practical part than themselves.

We should not allow a student to graduate from our colleges until he can *do reasonably* good work in *all* departments of dentistry. And the colleges to do this must pay substantial salaries to their chief demonstrators to be able to obtain such talent as is capable of practical teaching. And this talent is very scarce just at present.

Our dentists have been drifting too much of late years to look upon dentistry more in the light of a science, rather than an art; to get away, as it were, from the labor portion and depend upon theory to carry them through. This is an unfortunate mistake. Dentistry proper is a manipulative art, where success depends more upon manual dexterity mixed with common sense brain-work than all the classical theories imaginable; in a word, doing, *versus* telling how to do.

As the lesser of two evils, it is much wiser to consider our branch

of the profession from an empirical standpoint than scientific. We are not necessarily trades-people because we labor with our hands. Even if we are, what of it? Is it a disgrace to be a great engineer, who starts at the work-bench? Painter, whose grand conceptions are useless without manual dexterity? Even surgery and chemistry, the great levers of the universe, how could they succeed without manual labor? And the real success depends more upon the application of manipulative skill than mental training or conception, as the latter cannot reach success without the former. We cannot get away from the labor portion and be skilled dentists, benefiting suffering humanity, any more than the artist who paints the great picture. He is not looked down upon because his hands have labored so hard to produce this masterpiece. On the contrary, the world admires and courts him for his hard-earned laurels, which have been, not the result of scientific book research, but brain study of nature, educating the eye to practically direct the hands in labor.

The human race as a mass despises labor, and that is why so few men succeed in the great works of life. They lack ambition, lack individuality; the thirst for lucre blunts the nobler natures of many, while the greater proportion are content to be subservient to other men's wills, not having courage, or being too lazy, to try.

Many of the colleges, and some of our State conventions, are placing much stress upon "the defect of preliminary education," and discussing the requirements of a collegiate standard before admitting a student to their institutions. If they gave a little more care to the practical training of the young men's digital extremities they would without doubt turn out more thorough dentists.

If a young man has a good common-school education, can read and write his own language correctly, and has a *natural* mechanical mind to adapt himself to what he is taught, with some individuality about him, I predict that he will make a better all-round dentist than the classical scholar who carries off the first prize at his university and lacks the mechanical ability.

Understand, I am not disparaging broader education; far from it. I consider that a man cannot obtain too much education. I am only defending those whose circumstances have denied them the benefit of a liberal education; that they should not be debarred, but that we should extend a welcome hand to assist them to assist themselves later. I was once informed by the president of a great

university that it was seldom that a boy who was successful in athletic and other mechanical sports ever reached prominence in his classes outside of mathematics. This would rather imply that a higher education was not essential, though desirable, even to make a good dentist. The colleges should uphold each other against admitting or passing men who, with or without education, can never be qualified either as gentlemen or professional credits to the profession. Too many such have already been turned out upon society calling themselves dentists.

In glancing over the various dental journals, the lover of dental prosthesis is impressed with the extremely limited number of good articles written on prosthetic dentistry outside of what they call bridge-work. Even at our conventions it is rare that a good paper is presented on the subject, and it is frequently passed without discussion or even comment, unless some one wishes to advertise or sell some special article of his own.

Is it because there are so few men with mechanical brains in the profession, or because the practitioner considers it dirty work, beneath his dignity to soil his fingers with, or is it because the mechanical and artistic skill required to produce good work is beyond the capability of the modern dentist? I regret to say that experience and contact with the profession in all its phases lead me to believe and accept the latter theory.

It is an established fact that there are few good workers in the line of true dental prosthesis, and the fundamental cause is in the course of instruction given in our dental colleges. I have heard it asserted that out of a class of two hundred students in a prominent institution in this country there were only two men who declared that they liked "mechanical dentistry." Why is this? Is it because, like anatomy in the medical department of universities, it is usually made a dry study, taught by the professors by rule of A, B, C, from text-books, or because the professors treating this branch lack the ability to practically demonstrate what they teach?

We would advise the young men to read freely all the dental journals and text-books they can obtain, yet be extremely cautious as to accepting any of the theories therein contained until they have made notes and reduced them to actual practice, no matter what the reputation of the author. Experience will teach you later that it is not always the man who writes the most technical articles, or

endeavors to impress you at dental conventions in beautiful language how much scientific knowledge he may possess, that is the practical dentist who is able to benefit mankind by deeds.

Many of them, in fact, look upon the practical side of dentistry as degrading. They cover their failures by most fluent explanations to their patients, describing the weak quality of the teeth and the latest microbe theory, then prescribe a lot of the new "antiseptic," "antizymotic," "germicidal," and other nostrums flooding the market. Not that some of them are not *very valuable,* but the craze of this generation on this subject is extreme, if not absurd. "Cleanliness is next to godliness." Modern surgery, through antiseptic treatment, has revolutionized the world, but dentistry is retrograding through the desire to get away from the necessary labor connected with it to make practical success.

The men who look down upon the "mechanical" branch of dentistry and cry out loudly against the advertising man do not fail, however, to make all they can out of it by furnishing disgraceful apologies of impressions to these same men to do the dirty work for them, and encouraging this same degraded class of work by paying these men such a pittance for the finished article that they cannot afford, even if capable, to do clever work. We do not wonder that they are ashamed of this same work which they place in the mouth. We will venture to say that at least one-third of all the specimens made for college graduates are made by these same gentlemen and not by the students.

It is possible to make this branch of prosthetic dentistry thoroughly comprehensive, simple, and inviting to the young men by manipulative instruction, the only system by which dentistry can be learned or understood,—a clinical course and a college devoted entirely to the specialty of a dental education.

It is also possible to show that the so-called "dirty mechanical laboratory work" can be conducted on as cleanly principles as the tidiest operating room. There is no need to soil the hands a particle more than when working upon your patients at the chair. In fact, to do prosthetic work artistically cleanliness is an absolute necessity.

Text-books devote many pages to the description of taking impressions and making the bite or occlusion, yet how few dentists there are who comprehend them or are able to carry them out.

Few indeed. Yet how do you expect to build a substantial house without a solid foundation?

Bridge-work came into the profession rather as a curse than a blessing, from the same fact that there are so few good mechanics. For unless bridges are skillfully done, fitted accurately to the roots and other necessary piers, they are not only swill-traps in the mouth, but, through the badly-fitting caps and unnatural weight of the bridge by insufficient support, the destruction and loss of the teeth is becoming alarmingly greater from year to year.

We admit that a skillfully made bridge, perfectly fitted to a sufficient number of roots or teeth, light but strong, is a great blessing to a careful patient; but how few can construct such a piece,—how many attempt it. The demand for skillful prosthetic workers in dentistry to-day is greater than ever before. Many more can become fair operators, but it requires brains, mechanical, artistic brains, to become skilled in dental prosthesis.

The practice of making gold shells for the front of the mouth or anterior to the first bicuspid we most heartily condemn, and consider as malpractice, in the face of so many better methods more sightly.

The practical study of temperamental diagnosis in connection with the selection of teeth for artificial dentures, the nucleus of dental prosthetic art, is worthy of more attention on the part of dentists, as much depends upon this branch to produce natural effects.

We had hoped to submit a special paper on this matter, but time has prevented the necessary preparation of drawings to illustrate this very important subject properly; therefore it must be delayed, and we shall confine ourselves to a few criticisms upon the porcelain teeth found in the majority of our local dental depots. We cannot blame the manufacturers so much, as they must cater to the wants of the majority of dentists, who as a mass do not know what they want, never having been properly educated up to know how a really natural tooth looks. If a *true* critic will examine the stock in any small dealer or agent's store in this country, he will agree with us that at least one-half of the stock of porcelain teeth found there are unfit for use in a human being's mouth, in color, size, and shape; yet some of the manufacturers have the correct article at home, and when asked about them allow we are correct, but claim

that the masses who buy extensively demand the unnatural specimens in preference, because they strike their fancy, frequently buying upward of two hundred dollars' worth of a single mold of a small, narrow, shapeless tooth, and as white as they can get them. And as manufacturers they cater to the demand. We must therefore try to educate the dentist through the same channel,—his moneyed interest. There are few so degenerate who cannot change their method of work if you touch their pocket.

If we can show the masses that, by the proper selection of a tooth to harmonize with the features of the patient, they can make a little more money and reputation at no additional cost to them, everybody can be made happy. The patient is benefited, the dentist is benefited, the local depot man is benefited by not carrying stock of which much will at a final winding up be a loss, and the manufacturer will be benefited by not having to carry so many molds and grind so many pigments. The extremely white teeth, the dark blue, and the dark brown, as full sets are never found in nature; eight-tenths of all the teeth found in the depots are unnecessarily short bite on the palatal and lingual sides; they make the plates clumsy and thick at the very point where the tongue should have most play. Make two plates for the same patient, one long bite with thin plate, the other short bite and thick plate, and you will find your patient ready to pay you a third more for the first one.

Several years ago, if I remember correctly, one of the leading manufacturers sent out a circular to the dentists asking their preference as to up-and-down pins in bridge-facings or cross-pins. The answers were largely in favor of cross-pins. The final result is demonstrated in a small order given by myself to the same manufacturer a few days since for up-and-down pins in a few bicuspid teeth. I was informed that they were not kept in stock, but if I waited a few days I could get them at fifty cents each. The price does not enter into the question, but the principle is wrong. If you will consider a moment you will know that few bridge-workers have not suffered from the facings either splitting off in the mouth or cracking across in the soldering of the backings. It is only common sense that two metal pins set across the middle of a narrow porcelain tooth cannot possibly bear the strain of two pins placed longitudinally with the length of the tooth. Our greatest trouble is we do not think or reason enough, or we should get better results.

Finally, we can but apologize for this very incomplete paper on one of the most important subjects in dentistry. We can discuss the methods of preserving teeth as much as we please; the facts remain, the prosthetic worker, like the undertaker, must finally get the patient, principally through the following causes:

Carelessness and neglect	10 per cent.
Adulteration of food	10 " "
Nervous prostration	10 " "
Dyspepsia	20 " "
Malpractice in dentistry	50 " "

Code of Ethics.

REPORT OF COMMITTEE.

MR. PRESIDENT and Members of the National Dental Association: Your Committee appointed to submit a Code of Ethics for approval of this body, would respectfully recommend the adoption, with some slight changes and the addition of a section relating to consultations, of the Code of Ethics adopted by the American Dental Association in 1866, and in force at the time of the dissolution of that Association, which code was also in force with the Southern Dental Association.

Article I.—THE DUTIES OF THE PROFESSION TO THEIR PATIENTS.

Section 1. The dentist should be ever ready to respond to the wants of his patrons, and should fully recognize the obligations involved in the discharge of his duties toward them. As they are in most cases unable to correctly estimate the character of his operations, his own sense of right must guarantee faithfulness in their performance. His manner should be firm, yet kind and sympathizing, so as to gain the respect and confidence of his patients; and even the simplest case committed to his care should receive that attention which is due to operations performed on living, sensitive tissue.

Sec. 2. It is not to be expected that the patient will possess a very extended or a very accurate knowledge of professional matters. The dentist should make due allowance for this, patiently explaining many things which may seem quite clear to himself, thus endeavoring to educate the public mind so that it will properly appreciate the beneficent efforts of our profession. He should encourage no false hopes by promising success when, in the nature of the case, there is uncertainty.

Sec. 3. The dentist should be temperate in all things, keeping both mind and body in the best possible health, that his patients may have the benefit of that clearness of judgment and skill which is their right.

Article II.—MAINTAINING PROFESSIONAL CHARACTER.

Section 1. A member of the dental profession is bound to maintain its honor, and to labor earnestly to extend its sphere of usefulness. He should avoid everything in language and conduct calculated to dishonor his profes-

sion, and should ever manifest a due respect for his brethren. The young should show special respect to their seniors; the aged special encouragement to their juniors.

SEC. 2. It is unprofessional to resort to public advertisements, cards, handbills, posters, or signs, calling attention to peculiar styles of work, lowness of prices, special modes of operating; or to claim superiority over neighboring practitioners; to publish reports of cases or certificates in the public prints; to circulate or recommend nostrums; or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by cards, simply their names, occupation, and place of business, or, in the same manner, to announce their removal, absence from, or return to business, or to issue to their patients appointment cards having a fee bill for professional services thereon.

SEC. 3. When consulted by the patient of another practitioner, the dentist should guard against inquiries or hints disparaging to the family dentist, or calculated to weaken the patient's confidence in him; and if the interests of the patient will not be endangered thereby, the case should be temporarily treated, and referred back to the family dentist.

SEC. 4. When general rules shall have been adopted by members of the profession practicing in the same localities in relation to fees, it is unprofessional and dishonorable to depart from those rules, except when variation of circumstance requires it. And it is ever to be regarded as unprofessional to warrant operations as an inducement to patronage.

ARTICLE III.—CONSULTATIONS.

Consultations should be promoted in difficult or protracted cases, as they give rise to confidence, energy, and broader views in practice.

In consultations, that courtesy and just dealing which is the right of all should be especially observed.

ARTICLE IV.—THE RELATIVE DUTIES OF DENTISTS AND PHYSICIANS.

Dental surgery is a specialty in medical science. Physicians and dentists should both bear this in mind. The dentist is professionally limited to diseases of the dental organs and adjacent parts. With these he should be more familiar than the general practitioner is expected to be; and while he recognizes the broader knowledge of the physician in regard to diseases of the general system, the latter is under equal obligations to respect his higher attainments in his specialty.

ARTICLE V.—THE MUTUAL DUTIES OF THE PROFESSION AND THE PUBLIC.

Dentists are frequent witnesses, and, at the same time, the best judges of the impositions perpetrated by quacks, and it is their duty to enlighten and warn the public in regard to them. For this and many other benefits conferred by the competent and honorable dentist, the profession is en-

titled to the confidence and respect of the public, who should always discriminate in favor of the true man of science and integrity against the empiric and impostor. The public has no right to tax the time and talents of the profession in examinations, prescriptions, or in any way without proper remuneration.

Respectfully submitted,

H. A. Smith,
Henry W. Morgan,
Frank Holland,
Committee.

Standing Resolutions.

The following standing resolutions are in force at this time:

1. *Resolved,* That a paper presented to the Committee on Voluntary Essays, and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterward be read before the Association unless it is made the special order by resolution adopted.

2. *Resolved,* That this Association discountenances the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

3. *Resolved,* That it is unprofessional to use on cards or signs anything except name, title, and address.

4. *Resolved,* That this Association now in session direct that Sections belonging thereto shall in the future be prohibited from inviting individuals who are violating the Code of Ethics to hold clinics, or to give other exhibitions before this body.

5. *Resolved,* That a Standing Committee of three be appointed, to be known as the Committee on Terminology, whose duty it shall be to prepare and submit a carefully prepared report at each annual meeting of this Association.

6. *Resolved,* That this Association believes the conferring of honorary degrees in dentistry to be detrimental to the profession of dentistry, and hereby expresses its disapprobation of the practice.

7. *Resolved,* That a committee of three be appointed by the chair to cooperate with the Army Medical Museum and Library managers in enriching its stores of dental literature and specimens, especially by appealing to dental societies and individual members of the dental profession for assistance.

8. *Resolved,* That the National Dental Association condemns the use of secret preparations known as *"local anesthetics,"* as well as all other secret preparations.

9. *Resolved,* That the secretary or other officer of each society sending delegates to this Association is expected to make a general report of the work done by the society he represents during the year, giving the subjects of the papers read before them and digests of the same, and to send reports to the Secretary of this Association at least three weeks before the date of each annual meeting; the reports to be forwarded to the chairman of the Section to which they belong.

10. *Resolved*, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in the Association without payment of dues, and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

11. *Resolved*, That lists of the ex-Presidents of the American Dental Association and of the Southern Dental Association shall be published annually in the Transactions of the National Dental Association, and that all members and officers hold the same relation to the National Dental Association that they did to the former Associations.

12. *Resolved*, That the Secretaries of Sections are required to forward to the Chairman of the Executive Committee, sixty days before the annual meeting, the titles of papers to be submitted, with the names of the authors, in order that they may appear in the official program.

13. *Resolved*, That the Executive Committee shall prepare and mail to the members an official program, at least twenty days before the annual meeting. This program shall have a list of the hotels, the meeting place, and the railway or steamboat facilities for getting to the place of meeting from the principal points in the United States.

This notice shall be mailed to the journals at least one month before the annual meeting.

National Dental Association.

SOUTHERN BRANCH.

SESSION OF 1899.

CONTENTS.

	PAGE
Officers and Executive Committee	1
Welcoming addresses by Mayor Flower and Dr. Sarrazin, and responses.	2
President reads his address	2
Badges for members and visitors	2
Vacancies on Executive Committee filled by appointment	2, 12
Committee on Arrangements presents program	3
Report of Committee on Clinics deferred	3
Committee on Publication granted further time	3
Committee on Credentials offers partial report	3
Members present or having forwarded their dues	3
Minutes of last meeting read and approved	6
Committee on Orthodontia and Oral Surgery—Report	7
Dr. Cowardin's paper read	7
Dr. Young's paper read	8
Clinic Committee—Report	8
Committee on Operative Dentistry—Report	8
Committee on Necrology appointed	8
Telegram from Dr. Clifton read	8
Letter from Dr. Beadles read	9
Resolution of sympathy for Dr. Beadles adopted	9
Letters of regret read	9
Dr. Beadles's paper read	9
Message of condolence sent to Dr. Brophy	10
Corresponding Secretary granted further time for correspondence with life insurance companies	10
Dr. Leonard's paper read	10
Dr. Johnson's report made special order	11
Committee on Pathology, Materia Medica, and Therapeutics—Report	11
Dr. Johnson's paper read	11
Dr. Vignes's paper read	11
Resolution adopted indorsing proposed history of dentistry	12
Clinic Committee—Report	12
Committee on Chemistry, Metallurgy, and Anatomy—Report	13
Dr. Cowardin's paper read and subject passed	13
Committee on Microscopy, Histology, and Bacteriology—Report	13
Dr. MacLean's paper read	14

PAGE
Lantern exhibits by Dr. Sonntag and Mr. Cowardin 14
Letter from S. P. Cowardin read 14
Clinics continued 15
Paper by S. P. Cowardin read by title and ordered published 15
Committee on Appliances and Improvements—Report 15
President of National Dental Association introduced 16
Dr. Cowardin's paper read 16
Subject of amendments to Constitution laid on table 16
Resolution adopted requesting that next meeting of National Dental Association be held in Tennessee 16
Letter from Dr. Moore read 16
Committee on Dentists in Army and Navy—Report 16
Resolution adopted requesting co-operation of State Societies in appeals to Congressmen 16
Dr. Leonard's paper read 17
Dr. Wood's paper read 17
Dr. Gordon's paper read by title and ordered published 17
Dr. Hodgkin's paper read by title and ordered published 17
Resolutions adopted on subject of fraudulent colleges and sale of diplomas 17
Postponement of night parade and ball announced 17
Hospitalities tendered Association 17
Dr. Beadles's paper read 18
Dr. Johnston's paper read by title and ordered published 18
Committee on Oral Hygiene—Report 18
Dr. Corley's paper read 18
Dr. Cowardin's paper on Hygiene withdrawn 18
Dr. Beadles's paper read by title and ordered published 18
Dr. Cooke's paper read by title and ordered published 18
Dr. Knapp's paper read 18
Publication Committee—Report 18
Resolution adopted referring propositions for publication of Transactions to Publication Committee 19
Committee on Printing and Distribution of Constitution—Report 19
Committee on President's address—Report 19
Meeting of 1900 to be a special business meeting only 20
Election of officers 20
Treasurer's Report 21
Dr. Burkhart addresses the Association 21
Resolutions of thanks 21
Installation of officers 22

REPORTS AND VOLUNTARY PAPERS.

Report on Necrology 23
Address of Welcome by Mayor Flower 24
Address of Welcome by Dr. Sarrazin 25

PAGE
Response to Addresses of Welcome 27
Annual Address by William E. Walker, President 35
Report of Special Committee on President's Address 42
Report on Orthodontia and Oral Surgery 45
A Simplified Fracture Splint. By Jules J. Sarrazin 55
The Too Frequent Sacrifice of Teeth, in the Treatment of Diseases of the Antrum. By L. M. Cowardin 60
Oral Surgery—A Case in Practice. By R. C. Young 69
A Case in Practice. By C. B. Johnston 74
Report of Committee on Operative Dentistry 79
Combination Fillings. By L. A. Smith 87
Thoughts on Measuring and Preparing Approximo-Occlusal Cavities in Bicuspids and Molars. By Laurence Leonard 91
Report of Committee on Chemistry, Metallurgy, and Anatomy 103
A Case of Defective Tooth Development. By L. M. Cowardin 105
Report of Committee on Pathology, Materia Medica, and Therapeutics 107
Notes on Materia Medica, with Comments and Criticisms. By H. H. Johnson 112
The Fifth Cranial Nerve, Trigeminal; Trifacial. By William S. Gordon 127
Treatment of Pulpless Teeth by Iodoform Fumes under Pressure. By C. V. Vignes 133
Report of Committee on Microscopy, Histology, and Bacteriology 137
"Absorption Areas" and Pulp Nodules. By Samuel P. Cowardin 148
Formaldehyd in Dentistry. By H. Stuart MacLean 150
Microscopic Illustrations of the Effects of Cataphoresis. By A. F. Sonntag 159
Report of Committee on New Appliances and Improvements 163
Report of Clinics:
Dr. West 165
Dr. Johnson 168
Dr. Alexander 169
Dr. Clement 170
Dr. Foret 175
Dr. Leonard 176
Dr. Younger 178
Dr. Hinman 180
Hygiene. By J. Percell Corley 181
Sectional Bridge-Work. By E. P. Beadles 187
A Suggestion in Bridge-Work. By Wm. H. Cooke 188
Dentists in the Army and Navy. Action of Detroit Dental Society 192
Report of Committee on Dentists in the Army and Navy 193
Dentists in the Army and Navy. By Laurence Leonard 196
The Necessity of Dentists in the Army and Navy. By Wallace Wood, Jr. 202
Common Sense and the Status of the Dental Profession. By E. P. Beadles 207

PAGE
The Relation of the Practice of Dentistry to the Theory of Dental Education. By James B. Hodgkin 210
Report of Publication Committee 216
Dentistry of the Past and Present. By James S. Knapp 221

DISCUSSIONS.

Report of Committee on President's Address—discussed by

Dr. Crawford 43
Dr. Walker 43
Dr. Foster 44

Orthodontia and Oral Surgery—discussed by

Dr. Sarrazin 47
Dr. Holland 48
Dr. Allen 48
Dr. McKellops 48
Dr. Noel 48
Dr. Younger 49, 50, 52
Dr. Fife 50
Dr. P. J. Friedrichs 50
Dr. H. W. Morgan 50
Dr. Melendy 51
Dr. Clement 51
Dr. Johnson 52
Dr. L. M. Cowardin 53
Dr. Walker 53

A Simplified Fracture Splint—discussed by

Dr. P. J. Friedrichs 57
Dr. Walker 58
Dr. Blake 58
Dr. Sarrazin 59

The Too Frequent Sacrifice of Teeth, in the Treatment of Diseases of the Antrum—discussed by

Dr. Corley 63
Dr. Cowardin 64, 65, 66, 68
Dr. L. A. Smith 64
Dr. West 64
Dr. Holland 65
Dr. B. H. Smith 65
Dr. Noel 65, 68

Oral Surgery. A Case in Practice—discussed by

Dr. Walker 73

Operative Dentistry—discussed by

Dr. Merchant 83
Dr. McKellops 84
Dr. H. W. Morgan 85
Dr. Ames 85, 86
Dr. Allen 86
Dr. Hinman 86
Dr. Noel 86
Dr. Fife 86

Combination Fillings—discussed by

Dr. Crawford 89, 90
Dr. L. A. Smith 90

Measuring and Preparing Cavities—discussed by

Dr. Crawford 96, 101
Dr. B. H. Smith 96, 100
Dr. Clement 97
Dr. H. A. Smith 97
Dr. Wilson 98
Dr. Leonard 98, 100, 101
Dr. Merchant 98
Dr. H. W. Morgan 98, 100, 101
Dr. Barrett 99
Dr. Melendy 99
Dr. Ames 100

PAGE

Pathology, Materia Medica, and Therapeutics—discussed by
Dr. Holland 111

Materia Medica—discussed by
Dr. Barrett 120, 123
Dr. Crawford 122
Dr. H. A. Smith 123
Dr. Hinman 124
Dr. L. M. Cowardin 125
Dr. Foster 125
Dr. B. H. Smith 126
Dr. Johnson 126

Treatment of Pulpless Teeth by Iodoform Fumes under Pressure—discussed by
Dr. H. W. Morgan 135
Dr. West 135
Dr. Barrett 136
Dr. Vignes 136

Microscopy, Histology, and Bacteriology—discussed by
Dr. Clement 138, 147
Dr. Barrett 139, 144, 145
Dr. Crawford 144, 145, 147
Dr. L. M. Cowardin 145
Dr. Leonard 145
Dr. Knapp 146, 147
Dr. Walker 146

Formaldehyd in Dentistry—discussed by
Dr. Walker 154, 155, 156
Dr. Johnson 155, 156
Dr. MacLean 158

Removal of Septa and Alveolar Walls previous to Insertion of Artificial Teeth—discussed by
Dr. Knapp 173, 175
Dr. Clement 173, 174
Dr. Hinman 173, 174
Dr. Jewett 173
Dr. Crawford 174

Hygiene—discussed by
Dr. L. M. Cowardin 184
Dr. Crawford 185
Dr. Corley 186

Fraudulent Colleges—discussed by
Dr. Barrett 189
Dr. McKellops 191

Dentists in the Army and Navy—discussed by
Dr. B. H. Smith 193
Dr. McKellops 193
Dr. H. W. Morgan 194
Dr. Crawford 194
Dr. Allen 195
Dr. Leonard 195
Dr. Turner 195
Dr. Burkhart 205
Dr. J. McManus 205
Dr. Barrett 206

Dentists and Jury Duty—discussed by
Dr. White 208
Dr. Noel 208
Dr. Bauer 209
Dr. McKellops 209
Dr. West 209
Dr. L. M. Cowardin 209
Dr. Allen 209
Dr. Seals 209
Dr. Alexander 209
Dr. Foster 209

Publication of Transactions—discussed by PAGE

Dr. Foster..... 217
Dr. Jewett..... 217, 220
Dr. Walker..... 217
Dr. Crawford..... 219
Dr. H. W. Morgan..... 219, 220
Dr. Allen..... 220

MINUTES OF TRANSACTIONS

OF THE

SOUTHERN BRANCH

OF THE

National Dental Association,

SESSION OF 1899.

By S. W. FOSTER, Secretary.

FIRST DAY—MORNING SESSION.

THE Southern Branch of the National Dental Association commenced its second annual meeting, held in joint session with the Louisiana State Dental Society, in New Orleans, La., February 9, 1899. The meetings were held in the spacious quarters of the Fourth Battalion Louisiana State National Guard.

OFFICERS.

President, Dr. Wm. Ernest Walker, Pass Christian, Miss.
First Vice-President, Dr. Thos. P. Hinman, Atlanta, Ga.
Second Vice-President, Dr. H. H. Johnson, Macon, Ga.
Third Vice-President, Dr. E. F. Adair, Harmony Grove, Ga.
Treasurer, Dr. B. D. Brabson, Knoxville, Tenn.
Corresponding Secretary, Dr. C. L. Alexander, Charlotte, N. C.
Recording Secretary, Dr. Shepard W. Foster, Atlanta, Ga.

EXECUTIVE COMMITTEE.

Dr. W. R. Clifton, Waco, Tex., one year.
Dr. H. E. Beach, Clarksville, Tenn., one year.
Dr. V. E. Turner, Raleigh, N. C., two years.
Dr. S. B. Cook, Chattanooga, Tenn., two years.
Dr. E. G. Quattlebaum, Columbia, S. C., three years.
Dr. I. Simpson, Rock Hill, S. C., three years.

The meeting was called to order in joint session at 10.30 A.M.; the President, Dr. Wm. Ernest Walker, in the chair.

Dr. Jules J. Sarrazin, President of the Louisiana Society, also occupied a chair on the platform.

Dr. Sarrazin introduced the venerable Presbyterian divine, Dr. B. M. Palmer, who invoked God's blessing upon the deliberations of the assembled bodies.

The Mayor of the city, Hon. W. C. Flower, was next introduced, and extended a cordial and hearty welcome to the Associations.

Dr. Sarrazin tendered a graceful welcome on behalf of the Louisiana State Dental Society, and in response Dr. R. K. Luckie, Holly Springs, Miss., delivered an eloquent and patriotic address on behalf of the Southern Branch.

Dr. Luckie's strength failed him before completing his address, and he was compelled to leave the hall.

The President, Dr. Wm. Ernest Walker, next delivered his annual address, which was referred to the following committee: Drs. A. R. Melendy, I. Simpson, and T. L. Westerfield.

The Treasurer, Dr. B. D. Brabson, stated that Section 3 of Article V of the Constitution—"No member . . . can speak or vote in this Association until his annual dues are paid"—would be rigidly enforced, and that a membership badge would be furnished to each member when he paid his dues. He further explained that badges had been provided in three colors: blue for the members of the Louisiana State Dental Society, furnished by the Treasurer of that body; red badges, conferring all the privileges of the Association, for clinicians and essayists not members of either Association and other invited guests, including all the members of the National Dental Association, and white badges for members of the Southern Branch.

The chair appointed Drs. J. P. Corley and T. M. Allen to fill vacancies *pro tem.* on the Executive Committee, to which committee delegates present their credentials to be approved before paying dues to the Treasurer and receiving badges. On motion, adjourned to 2 P.M.

FIRST DAY—AFTERNOON SESSION.

Called to order in joint session pursuant to adjournment; the President, Dr. Walker, in the chair; Dr. Sarrazin, President of the Louisiana Society, also occupying a seat on the platform.

Report of Committee on Arrangements. Dr. L. D. Archinard, chairman of the committee, offered the printed program, which he said would show for itself what arrangements had been made for the meeting. The report of the committee was received with applause.

Report of Committee on Clinics. Report deferred, the chairman not being present.

Report of Committee on Publication. The committee asked for further time, which was granted.

Report of Committee on Credentials. The committee made a partial report, which was subsequently completed, as follows:

Alabama Dental Association—Geo. S. Vann, Gadsden.

Arkansas Dental Association—W. K. Buckley, Little Rock; S. W. Johnson, Fayetteville; W. H. Marshall, Little Rock.

Florida State Dental Association—W. G. Mason, Tampa.

Georgia State Dental Society—S. H. McKee, Americus.

Louisiana State Dental Society—L. D. Archinard, A. J. Foret, Chas. Mermilloid, Jr., C. V. Vignes, and Wallace Wood, Jr., New Orleans.

Mississippi Dental Association—J. D. Wise, West Point; W. R. Wright, Jackson.

South Carolina State Dental Association—D. L. Boozer, Newberry; E. N. Kibbler, Prosperity.

Tennessee Dental Association—J. P. McDonald, Shelbyville.

Texas State Dental Association—J. W. Combs, New Braunfels; E. F. Comegys, Gainesville; Sam. G. Duff, Greenville; S. W. Johnson, Navisota; M. S. Merchant, Giddings.

West Virginia Dental Society—J. W. Storer, Wheeling.

The Secretary next read the roll-call. The following members were either present or have paid their dues for 1899:

ALEXANDER, C. L. ..... 8 S. Tryon St., Charlotte, N. C.
ALLEN, T. M. ..... P. O. Box 718, Birmingham, Ala.
ARCHINARD, L. D. ..... 907 Dauphine St., New Orleans, La.
BAUER, JOSEPH ..... 108 Bourbon St., New Orleans, La.
BEACH, H. E. ..... 422 Franklin St., Clarksville, Tenn.

Beach, Jno. R. ..... 422 Franklin st., Clarksville, Tenn.
Beadles, E. P. ..... 324 Main St., Danville, Va.
Bland, Chas. A. ..... Charlotte, N. C.
Bland, M. A. ..... Charlotte, N. C.
Benton, J. H. ..... Newberne, N. C.
Boozer, D. L. ..... Columbia, S. C.
Boozer, J. Edmond ..... Columbia, S. C.
Brabson, B. D. ..... 522½ S. Gay St., Knoxville, Tenn.
Buckley, W. H. ..... 510½ Main St., Little Rock, Ark.
Cassidy, J. S. ..... 732 Madison Ave., Covington, Ky.
Clifton, W. R. ..... 59 Provident Bldg., Waco, Texas.
Clement, Geo. B. ..... Macon, Miss.
Comegys, E. F. ..... Gainesville, Texas.
Combs, J. W. ..... New Braunfels, Texas.
Corley, J. P. ..... Greensboro, Ala.
Cowardin, L. M. ..... 407 E. Main St., Richmond, Va.
Crawford, J. Y. ..... Jackson Bldg., Nashville, Tenn.
David, J. W. ..... Mexia, Texas.
Dickson, Southall ..... Bolivar, Tenn.
Dotterer, L. P. ..... 102 Broad St., Charleston, S. C.
Duff, Sam. G. ..... Greenville, Texas.
Eaton, A. R. ..... 1141 E. Jersey St., Elizabeth, N. J.
Everitt, D. E. ..... Raleigh, N. C.
Ewald, W. H. ..... Portsmouth, Va.
Fife, J. G. ..... 301 Trust Bldg., Dallas, Texas.
Finney, W. B. ..... Baltimore, Md.
Foret, A. J. ..... 124 Baronne St., New Orleans, La.
Foster, S. W. ..... 62 Inman Bldg., Atlanta, Ga.
Frazier, J. E. ..... Birmingham, Ala.
Grindall, C. S. ..... 421 N. Charles St., Baltimore, Md.
Hall, J. A. ..... Collinsville, Ala.
Hardy, Geo. E. ..... Commonwealth Bank Bldg., Baltimore, Md.
Harris, Jos. H. ..... Baltimore, Md.
Hinman, T. P. ..... 64 Inman Bldg., Atlanta, Ga.
Holland, Frank ..... 24 Whitehall St., Atlanta, Ga.
Jewett, H. R. ..... 503 Grand Bldg., Atlanta, Ga.
Johnson, H. H. ..... 306 Second St., Macon, Ga.
Johnson, S. W. ..... Fayetteville, Ark.
Johnson, S. W. ..... Navisota, Texas.
Johnstone, A. P. ..... Anderson, S. C.
Kells, C. E., Jr. ..... Medical Bldg., New Orleans, La.
Kettig, Ed. M. ..... 319 W. Walnut St., Louisville, Ky.
Kibbler, E. N. ..... Prosperity, S. C.
King, A. B. ..... 201 N. Eutaw St., Baltimore, Md.
Knapp, J. Rollo ..... 620 Canal St., New Orleans, La.

Luckie, R. K. ..... Holly Springs, Miss.
Marshall, John S. ..... 34 Washington St., Chicago, Ill.
Marshall, W. H. ..... 501½ Main St., Little Rock, Ark.
Martin, W. T. ..... Yazoo City, Miss.
Mason, W. G. ..... Tampa. Fla.
Melendy, A. R. ..... Deidrich Bldg., Knoxville, Tenn.
Merchant, M. S. ..... Giddings, Texas.
Mermilloid, Chas., Jr. ..... 213 N. Rampart St., New Orleans, La.
McAnally, F. H. ..... Jasper, Ala.
McDonald, J. P. ..... Shelbyville. Tenn.
McKee, S. H. ..... Americus, Ga.
Morgan, H. W. ..... 211 N. High St., Nashville, Tenn.
Noel, L. G. ..... 527½ Church St., Nashville, Tenn.
Renalds, W. R. ..... Salem, Va.
Rush, R. A. ..... 12 St. Joseph St., Mobile, Ala.
Rutledge, B. ..... Florence, S. C.
Sarrazin, Jules J. ..... Morris Bldg., New Orleans, La.
Seals, R. D. ..... Ft. Smith, Ark.
Sill, C. ..... 301 W. 12th St., New York, N. Y.
Simpson, I. ..... Rock Hill, S. C.
Smith, B. Holly ..... 1007 Madison Ave., Baltimore, Md.
Smith, L. A. ..... Port Gibson, Miss.
Storer, J. W. ..... Exchg. Bk. Bldg., Wheeling, W. Va.
Turner, V. E. ..... 107½ Fayetteville St., Raleigh, N. C.
Vann, Geo. S. ..... Gadsden, Ala.
Vignes, C. V. ..... 3530 Magazine St., New Orleans, La.
Walker, Wm. Ernest ..... Northrop Bldg., Pass Christian, Miss.
West, T. C. ..... 508 Main St., Natchez, Miss.
Westerfield, T. L. ..... 232 Main St., Dallas, Texas.
Whitby, T. P. ..... Selma, Ala.
White, Gordon ..... 610½ Church St., Nashville, Tenn.
White, J. H. ..... Elizabeth City, N. J.
Wilson, F. C. ..... 12 Jones St., E., Savannah, Ga.
Wise, J. D. ..... West Point, Miss.
Wood, F. L. ..... Roanoke, Va.
Wood, Wallace, Jr. ..... 625 Canal St., New Orleans, La.
Wright, W. R. ..... Jackson, Miss.
Younger, W. J. ..... Suite 306, Auditorium, Chicago, Ill.

All surviving charter members of the Southern Dental Association are "permanent members without dues," as follows:

Arrington, B. F. ..... Goldsboro, N. C.
Arrington, W. T. ..... Memphis, Tenn., 338 Main St.
Augspath, Louis ..... Little Rock, Ark., 500½ Main St.
Boyd, H. D. ..... Troy, Ala.
Brown, J. P. H. ..... Augusta, Ga., 919 Broad St.
Burr, W. H. ..... Madison, Ga.

Carpenter, L. D.....Atlanta, Ga., 47½ Whitehall St.
Clark, F. Y.....Saratoga, N. Y.
Cole, W. T.....Newnan, Ga.
Cooke, W. H.....Denton, Texas.
Friedrichs, J. G..... New Orleans, La., 641 St. Charles St.
Gorgas, F. J. S.....Baltimore, Md., 845 N. Eutaw St.
Holland, S. G.....Atlanta, Ga., 24½ Whitehall St.
Knapp, J. S.....N. Orleans, La., 721 Washington Ave.
Lowrance, H. A.....Athens, Ga.
Marshall, E. B.....Rome, Ga.
McDonald, R. A.....Griffen, Ga.
Morgan, W. H.....Nashville, Tenn., 211 North High St.
Rambo, Sam'l.....Montgomery, Ala.
Tigner, J. A.....Rome, Ga.

The following honorary members of the Southern Dental Association sustain the same relation to the Southern Branch of the National Dental Association, and are entitled to the Transactions:

Samuel Hape, Atlanta, Ga., care Consol. Den. Mfg. Co.
L. McLain Tiffany, University of Maryland, Baltimore.
T. O. Summers, Nashville, Tenn.
J. W. Selby, Atlanta, Ga.
Mrs. J. M. Walker, Waveland, Miss. (Mrs. M. W. J.)
Miss Emma Prewitt, Franklin, Tenn.
J. N. Crouse, Chicago, Ill., 2231 Prairie avenue.
J. C. Wedgewood, London, England.
W. B. McLeod, Edinburgh, Scotland.

Honorary Member Southern Branch National Dental Association—Frank Woodbury, Halifax, N. S.

Any inaccuracies in the above list, in name or address, should be reported to the Treasurer at once, in order that the necessary corrections may be made. Address B. D. Brabson, Treasurer Southern Branch National Dental Association, 522½ S. Gay street, Knoxville, Tenn.

Reading the minutes being the next order of business, the Secretary began the reading.

Dr. B. Holly Smith, seconded by Dr. A. B. King, moved that the reading be dispensed with.

With the consent of his second, Dr. Smith withdrew his motion at the request of several members who were not present at the St. Augustine meeting, and who expressed a desire to know what had been done at that meeting, the Proceedings being not yet in print.

The Secretary completed the reading of the minutes, which, after some minor corrections, were approved.

Reports of Scientific Committees, beginning with No. 6, according to the daily order of business laid down in the By-Laws.

The report of the chairman of Committee No. 6, Orthodontia and Oral Surgery, Geo. E. Hardy, M.D., D.D.S., Baltimore, Md., chairman, was, in the absence of Dr. Hardy, read by Dr. R. D. Seals, Fort Smith, Ark. The discussion of the report was opened by Dr. Jules J. Sarrazin, continued by Drs. Frank Holland, T. M. Allen, H. J. McKellops, L. D. Archinard, L. G. Noel, W. J. Younger, J. G. Fife, P. J. Friedrichs, H. W. Morgan, A. R. Melendy, Geo. B. Clement, H. H. Johnson, L. M. Cowardin, and W. E. Walker. (First Vice-President T. P. Hinman in the chair.)

(1) Paper entitled "The Too Frequent Sacrifice of Teeth in Treatment of Diseases of the Antrum," by Dr. L. M. Cowardin, Richmond, Va. (member of the committee). Dr. Cowardin asked the privilege of reading his paper at a later session, his baggage having been delayed in transit—the paper being in his trunk. Granted, and on motion the paper was made the first order of business for the night session.

(2) Paper entitled "A Simplified Fracture Splint," by Jules J. Sarrazin (member of the committee). Dr. Sarrazin read his paper, the discussion of which was opened by Dr. P. J. Friedrichs, continued by Drs. W. E. Walker, A. E. Blake (San Francisco, Cal.), L. M. Cowardin, and closed by Dr. Sarrazin.

On motion, adjourned to 7 P.M.

FIRST DAY—NIGHT SESSION.

Called to order pursuant to adjournment; the President in the chair.

The Secretary read the minutes, which were approved.

The special order of business was called, and Dr. Cowardin read his paper, entitled "The Too Frequent Sacrifice of Teeth in Treatment of Diseases of the Antrum." The discussion was opened by Dr. J. P. Corley, and continued by Drs. L. A. Smith, T. C. West, Frank Holland, B. Holly Smith, L. G. Noel, and closed by Dr. Cowardin.

(3) Paper by Dr. R. C. Young, Anniston, Ala. (member of the committee), entitled "A Case in Oral Surgery," was read by the Secretary, and discussed by Dr. W. E. Walker.

On motion, adjourned to 10 A.M. Friday.

SECOND DAY—MORNING SESSION.

Called to order according to adjournment; the President in the chair.

The minutes were read and approved.

Report of Clinic Committee. Dr. T. P. Hinman, chairman of committee, stated that some of the clinicians had not yet arrived, and, as the arrangements were not entirely perfected, asked permission of the Association to postpone the clinics till Saturday morning, with the exception of the microscopic exhibit of Samuel Cowardin, F.R.M.S., of Richmond, Va., for which everything was in readiness. Unanimous consent being granted, Dr. L. M. Cowardin and Dr. H. Stuart MacLean, of Richmond, were given control till 11.15 A.M., when the Association was again called to order.

Report of chairman of Committee No. 7, Operative Dentistry, Dr. J. G. Fife, Dallas, Tex. The discussion of the report was opened by Dr. M. S. Merchant, Giddings, Texas, and continued by Drs. McKellops, H. A. Smith (Cincinnati), T. P. Hinman, L. M. Cowardin, B. D. Brabson, H. W. Morgan, Wm. V-B. Ames (Chicago), T. M. Allen, L. G. Noel, and closed by Dr. Fife.

(1) Paper by Dr. L. A. Smith, Port Gibson, Miss. (member of the committee), entitled "Combination Fillings." Discussion opened by Dr. J. Y. Crawford, and closed by Dr. L. A. Smith.

The chair appointed the following Committee on Necrology: H. W. Morgan, chairman; L. M. Cowardin, T. C. West.

The following telegram was read and received with applause:

"Much to my regret, important private business prevents my attendance. Love to the boys.

"W. R. CLIFTON, Waco, Texas."

The following letter from Dr. E. P. Beadles, of Danville, Va., ex-President of the Southern Branch, was read by the Secretary:

DANVILLE, VA., Feb. 6, 1899.

DR. WM. ERNEST WALKER:

Dear Doctor,—I am very much disappointed. I had made all arrangements to be with you this week, but am summoned on the jury; have never served, and no other court in this State makes dentists serve that I know of; but the judge here has put our names in the jury box, and hence we are drawn. I believe this to be an injustice; but the judge would not excuse me, even to attend the Association. Please be kind enough to explain to the members why I am not there, as I fully intended coming. With this I send you a paper along this line; also one on Sectional Bridgework, which you can read if you like. The one on "Common Sense and the Status of the Dental Profession" may not be much, but I'd like for it to be read if possible.

Wishing you a most successful meeting, I am very truly yours,

E. P. BEADLES.

Dr. J. Y. Crawford offered the following resolution:

Resolved, That the Southern Branch of the National Dental Association hereby desires to express to Dr. Beadles their regret at his absence, and that it is the sense of this Association that the judge of that District Court of Virginia has transgressed all the rules of ordinary courtesy.

Unanimously adopted.

The Secretary stated that letters expressive of regrets at inability to be present at the meeting, and wishing a successful and profitable meeting, had been received by the President from a number of prominent members of the profession; among others Dr. Thos. Fillebrown, Boston, Mass., ex-President of the National Association; Dr. J. Taft, Cincinnati, Ohio; Prof. Jas. B. Hodgkin, Washington, D. C.; Dr. L. C. Moore, Detroit, Mich.; Dr. H. R. Jones, President of the West Virginia State Dental Society; Dr. J. N. Webster, President of the Virginia Tidewater Dental Association; Dr. Harvey Iredell, New Jersey, and others not members of the Southern Branch, as well as from many of our own members.

Dr. Cowardin moved that the resolution be extended to cover all who have sent fraternal greetings. It was so ordered.

The Secretary read the paper by Dr. Beadles, entitled "Common Sense and the Status of the Dental Profession."

The subject of "Dentists and Jury Duty" was discussed by Drs.

Gordon White, L. G. Noel, Joseph Bauer, T. C. West, C. L. Alexander, R. D. Seals, T. M. Allen, H. J. McKellops, L. M. Cowardin, S. W. Foster. Subject passed.

On motion, adjourned to 3 P.M.

SECOND DAY—AFTERNOON SESSION.

Called to order pursuant to adjournment; the President in the chair.

The minutes were read and approved.

Dr. B. Holly Smith, in most feeling terms, announced the sad intelligence of the death of the loved wife of Dr. Truman W. Brophy, Chicago, and moved that the Secretary be instructed to send a telegraphic message of condolence on the part of the Southern Branch of the National Dental Association, in session convened. The resolution was adopted by a rising vote, with bowed heads.

Report of Corresponding Secretary on correspondence with life insurance companies, in reference to examination of the teeth of applicants for policies. The Secretary asked for further time. On motion of Dr. Crawford, the Secretary was instructed to continue the correspondence during the coming year, and to report at the next annual meeting.

Committee No. 7, Operative Dentistry, continued:

Dr. Laurence F. Leonard, Waseca, Minn., read a paper entitled "Thoughts on Measuring and Preparing Approximo-Occlusal Cavities in Bicuspids and Molars."

The discussion was opened by Dr. J. Y. Crawford, and continued by Drs. B. Holly Smith, S. W. Foster, Geo. B. Clement, H. A. Smith, F. C. Wilson, H. W. Morgan, W. S. Merchant, W. C. Barrett, A. R. Melendy, Wm. V-B. Ames, H. H. Johnson, and closed by Dr. Leonard.

Operative Dentistry passed *pro tem.*

On motion of Dr. B. Holly Smith, the report of Dr. H. H. Johnson, chairman of Committee No. 9, was made the special order of business for the next session.

On motion, adjourned to 8 P.M.

SECOND DAY—NIGHT SESSION.

Called to order pursuant to adjournment; the First Vice-President, Dr. T. P. Hinman, in the chair.

The minutes were read and approved.

The special order of business was called for, and Dr. H. H. Johnson, chairman of Committee No. 9, Pathology, Materia Medica, and Therapeutics, read his report, which, on motion of Dr. Frank Holland, was accepted with the thanks of the Association for a document so valuable for reference. The report was ordered published in full in the Transactions.

Dr. Johnson then read his paper, entitled "Notes on Materia Medica, with Comments and Criticisms."

Discussion opened by Dr. W. C. Barrett, and continued by Drs. J. Y. Crawford, H. A. Smith, L. M. Cowardin, S. W. Foster, B. Holly Smith, and closed by Dr. Johnson. Subject passed.

Committee No. 7, Operative Dentistry, recalled; the President in the chair.

Dr. C. V. Vignes, New Orleans (member of the committee), read a paper entitled "Treatment of Pulpless Teeth by Iodoform Fumes under Pressure;" referred to the Association by the Louisiana State Society.

Discussion opened by Dr. T. C. West, and continued by Drs. W. S. Merchant, W. C. Barrett, and closed by Dr. Vignes. Operative Dentistry passed.

The President requested that the Association elect four members to fill vacancies on the Executive Committee.

Dr. Crawford moved that the chair appoint the necessary number. Dr. Walker asked Dr. Crawford to withdraw the motion, and requested that the Vice-President be authorized to make the appointments. Unanimous consent being given, Dr. Hinman appointed Drs. J. G. Fife, Texas; T. C. West, Mississippi; T. M. Allen, Alabama, and L. G. Noel, Tennessee, to serve on the Executive Committee during the present meeting, Dr. V. E. Turner, acting chairman, and Dr. I. Simpson being the only members of the committee in attendance.

Dr. Gordon White addressed the Association on the subject of the proposed history of dentistry in America, and referred in feeling terms to the death of Dr. R. Finley Hunt, Washington, D. C., one of the most active workers on the committee appointed at Old Point Comfort in 1897.

Dr. B. Holly Smith offered the following resolution:

Resolved, That we, the Southern Branch of the National Dental Association, appreciate the importance of the work undertaken by this committee, and that we pledge our sympathy and assistance in this undertaking, and hereby place ourselves on record as supporting this measure.

The resolution was unanimously adopted.

On motion, adjourned to 9 A.M. Saturday, for clinics.

THIRD DAY—MORNING SESSION.

Called to order pursuant to adjournment; Dr. Jules J. Sarrazin, President Louisiana State Dental Society, in the chair.

The chairman of the Clinic Committee, Dr. T. P. Hinman, offered the following report:

The Clinic Committee beg leave to make the following report:

Realizing that some change in the method of conducting the clinics would be advisable, we, the Clinic Committee, have decided to hold the clinics one at the time, while the Association is in order under the control of the President.

The clinics are intended to demonstrate methods of doing work and not necessarily the skill of the individual operator. For this reason most of the clinicians will make their demonstration on models prepared beforehand for the purpose.

It is respectfully requested that all members of the Association will remain seated during the clinics, and all remarks be addressed to the President. As chairman of clinics I may say I have had five or six years' experience in the management of clinics, and have found so many objectionable features to the old system I think this system is worthy of a trial, as it proved very successful at a meeting of the Georgia State Dental Association last June. (At that time Dr. Catching and myself had charge.) If this method proves successful, it is the hope of the Clinic Committee that this system will be followed in the future; if not, then some new method can be decided on or go back to the old system.

We, the Clinic Committee, respectfully request a full expression on the part of the members of the Society as to the advantages and disadvantages of this method.

Respectfully submitted,

T. P. Hinman, *Chairman,*
R. K. Luckie,
J. Rollo Knapp.

Clinics were then conducted on the plan outlined by the committee until adjournment at 1 o'clock. Clinics to be continued on Monday.

THIRD DAY—AFTERNOON SESSION.

The Association was called to order at 3 P.M.; the Vice-President, Dr. T. P. Hinman, in the chair.

The minutes were read and approved.

Committee No. 8, Chemistry, Metallurgy, and Anatomy. Dr. A. B. King, chairman, read his report, which was accepted with the thanks of the Association for the able and exhaustive report. The report was ordered published in the Transactions.

"A Case of Defective Tooth Development," reported by Dr. Cowardin. Subject passed.

Committee No. 10, Microscopy, Histology, and Bacteriology, Dr. W. T. Martin, Yazoo City, Miss., chairman. In the absence of Dr. Martin, his report was read by Dr. Geo. B. Clement, who opened the discussion. The discussion was continued by Drs. Barrett, Crawford, Leonard, Jas. S. Knapp, Walker, King, and closed by Dr. Clement.

Dr. H. Stuart MacLean, Richmond, Va., next read a paper entitled "Formaldehyd in Dentistry."

The discussion was opened by Dr. Walker, and continued by Dr. H. H. Johnson, and closed by Dr. MacLean.

On motion, adjourned to meet at 7 P.M. at the Medical Department of Tulane University, for the lantern exhibits.

THIRD DAY—NIGHT SESSION.

The Association was called to order in the Microscopical Laboratory of the Medical Department of Tulane University, the projection microscope of that institution having been placed at the disposition of the Committee on Microscopy and Histology.

The session was devoted to a series of lantern exhibits, as follows:

Lantern exhibit, entitled "Microscopic Effects of Cataphoresis," by Dr. A. F. Sonntag, Waco, Texas.

Lantern exhibit, entitled "Histology and Microscopic Pathology of the Teeth," by Samuel P. Cowardin, F.M.R.S., Richmond, Va.

The following letter was read by the Secretary and ordered spread upon the minutes:

RICHMOND, VA., February 8, 1899.

DR. WM. E. WALKER, PRESIDENT SOUTHERN BRANCH NATL. DENTAL ASSO.:

Dear Doctor,—I regret very much that I have been unable to accept your very kind invitation to attend the New Orleans meeting of your Association. I had looked forward anticipating much pleasure on this occasion, and when I talked to you about it I felt quite sure that I could be with you; but I have been kept so busy that I could make no preparation, and now I find that it is impossible for me to leave to make the trip to New Orleans.

I have made up some slides which, with my microscope, I have trusted to my brother, Dr. L. M. Cowardin, and hope that he may find something in them of interest to some of the members of your Association. I have also managed to get made for him some lantern slides of portions of these tooth sections.

Unfortunately for me now, I sold to Dr. J. Leon Williams all the finest and rare slides I had made in the past three or four years. This leaves me at this time with practically no tooth preparations except the ones I have

made hurriedly. I hope that in examining these, allowance will be made for the pressure I have been under, and that they will not be taken as samples of my best work. I shall hope some day to be able to attend some meeting of your Association and make a creditable exhibit of my work. I shall be glad to hear directly from any who are specially interested in this class of work. We may be able to help each other, and my interest is so great that I will gladly give to it all the time I can spare from my business. Feeling sure that I will not be missed, and hoping that the meeting may prove in every way a success, I am

Sincerely yours,

S. P. Cowardin.

The exhibits were discussed by Drs. Cowardin, Hinman, and Walker.

Adjourned early on account of the unprecedented weather, the mercury falling lower than ever before known in New Orleans.

Adjourned to Monday, February 13, at 10 A.M.

FOURTH DAY—MORNING SESSION.

The Association was called to order at 10 A.M.; the Second Vice-President, Dr. H. H. Johnson, in the chair.

Clinics were continued till 11.30, when the Association was again called to order. Reports of the clinics were subsequently furnished by the clinicians at the request of the chairman, Dr. Hinman.

Called to order again at 11.30 A.M. In the absence of the Secretary, reading of the minutes was deferred.

Committee No. 10 recalled. On motion of Dr. Cowardin, a paper, entitled "Absorption Areas and Pulp Nodules," by S. P. Cowardin, F.R.M.S., was read by title and ordered published in the Transactions.

Committee No. 11, Appliances and Improvements. Dr. T. M. Allen, chairman, read his report, which, on motion of Dr. Crawford, was referred to the Publication Committee.

Committee No. 12, Education, Literature; Voluntary and Special Essays, Dr. T. P. Whitby, Selma, Ala., chairman.

Dr. H. J. Burkhart, President of the National Dental Association, entered the hall at this point. Dr. Burkhart was welcomed by the President and introduced to the Association.

Dr. Burkhart responded gracefully to the welcome, and was greeted with warm applause.

Dr. L. M. Cowardin read a paper, entitled "Suggestions for Amendments to the Constitution."

Dr. H. R. Jewett moved that the paper be printed and distributed among the members of the Association, that they may be prepared to act upon it at Niagara Falls.

Dr. J. Y. Crawford moved as a substitute that the whole matter be tabled, as a matter in which the Branch is not competent to act.

The substitute was adopted by a small majority.

Dr. Wm. Ernest Walker offered the following resolutions:

WHEREAS, According to the Constitution of the National Dental Association, the next annual meeting of that body shall be held in the division known as the South; therefore be it

Resolved, By the Southern Branch of the National Dental Association now in session, that it is the request of this body that the annual meeting of the National Dental Association, in the year 1900, be held in the State of Tennessee; be it further

Resolved, That the Corresponding Secretary of this Association be and is hereby instructed to notify the proper officers of the National Dental Association of this action on the part of the Southern Branch, by sending them a copy of these resolutions.

The resolutions were unanimously adopted.

A letter from Dr. L. C. Moore on the subject of dentists in the army and navy was read by the Secretary.

Report of Committee on Dentists in the Army and Navy. Dr. B. Holly Smith, in the absence of the chairman of the committee, Dr. J. A. Chapple, made a brief verbal report.

Subject discussed by Drs. H. J. McKellops, H. W. Morgan, T. P. Hinman, J. Y. Crawford, T. M. Allen, Laurence P. Leonard, and V. E. Turner.

Dr. Turner moved that the Secretary be instructed to request the

co-operation of the State societies in impressing upon their members the importance of individual appeals to their Representatives and Senators in Congress. Adopted.

Ex-Lieut. Laurence P. Leonard, D.D.S., Co. K, late Twelfth Minnesota Volunteers, read a paper, entitled "Dentists in the Army and Navy."

Dr. Wallace Wood, Jr., New Orleans, read a paper bearing the same title.

The subject was further discussed by Drs. H. J. Burkhart, M. S. Merchant, James McManus, L. A. Smith, and closed by Dr. W. C. Barrett. Subject passed.

On motion of Dr. Walker, the paper entitled "Physiology of the Trigeminus," by Dr. Wm. S. Gordon, Richmond, Va., was read by title and ordered published in the Transactions.

A voluntary essay by Prof. Jas. B. Hodgkin, Washington, D. C., entitled "The Relation of the Practice of Dentistry to the Theory of Dental Education," was, on motion of Dr. J. Y. Crawford, read by title and ordered published in the Transactions.

Dr. B. Holly Smith offered a series of resolutions on the subject of fraudulent colleges and the sale of diplomas. The subject was discussed by Drs. W. C. Barrett and H. J. McKellops, and the resolutions unanimously adopted.

Dr. J. Rollo Knapp, chairman of the Carnival Entertainments Committee, announced that, owing to the inclement weather, there would be no night parade and no Proteus ball or tableaux, to which the committee had obtained invitations for such of the members as had requested them. Dr. Knapp then distributed "Rex souvenirs" and invitations for the Rex court reception and ball Tuesday night.

The hospitalities of the Harmony Club and the Young Men's Gymnastic Club were tendered the Association through Drs. Foret and Knapp.

Through Dr. Joseph Bauer an invitation was extended to the members of the Association by the librarian, Mr. Wm. Beer, to visit the Howard Memorial and Fisk Free and Public Libraries.

The Secretary read a paper by Dr. E. P. Beadles, Danville, Va., entitled "Common Sense and the Status of the Dental Profession." Discussion opened by Dr. L. G. Noel, and continued by Drs. H. J. McKellops and Joseph Bauer. Subject passed.

A paper by Dr. C. B. Johnston, Monroe, La., entitled "A Case in Oral Surgery," referred to the Association by the Louisiana State Dental Society, was, on motion of Dr. J. Y. Crawford, read by title and ordered published in the Transactions.

The Secretary having arrived, the minutes of the preceding session were read and approved.

Committee No. 4, Oral Hygiene, was called. The chairman, Dr. L. M. Cowardin, read his report, which was accepted and passed without discussion.

Dr. J. P. Corley, Greensboro, Ala., then read a paper entitled "Hygiene." The discussion of the paper was opened by Dr. L. M. Cowardin, and closed by Dr. Corley.

Dr. L. M. Cowardin asked permission to withdraw his paper on "Hygiene," which was granted. Subject passed.

Committee No. 5, Prosthetic Dentistry, called. No report was received from the chairman, Dr. J. A. Dale, Nashville, Tenn.

A paper entitled "Sectional Bridge-Work," by Dr. E. P. Beadles, was, in the absence of the author, read by title and ordered published in the Transactions.

A paper entitled "A Suggestion in Bridge-Work," by Dr. Wm. H. Cooke, Denton, Tex., was, in the absence of the author, read by title and ordered published in the Transactions.

Dr. Jas. S. Knapp, New Orleans, La., read a paper entitled "Dentistry, Past and Present." The paper was accepted with the thanks of the Association.

Dr. S. W. Foster, chairman *ex-officio* of the Publication Committee, read his report, which, on motion of Dr. Jewett, was received and opened to discussion. Discussed by Drs. Jewett, Walker, H. W. Morgan, and T. M. Allen.

Propositions from the Consolidated Dental Manufacturing Company, publishers of the *Items of Interest*, per R. Ottolengui, editor, and from The S. S. White Dental Manufacturing Company, publishers of the *Dental Cosmos*, per F. L. Hise, business manager, for the publication of the Transactions of the Southern Branch were read. Dr. J. Y. Crawford moved that the whole matter be tabled. Dr. H. W. Morgan moved as a substitute that the matter be referred to the Publication Committee. The substitute resolution was adopted.

On motion, adjourned to 4 P.M.

FOURTH DAY—AFTERNOON SESSION.

Called to order at 4 P.M.; First Vice-President in the chair.

Minutes of the morning session read and approved.

Report of Committee on Printing and Distribution of Constitution.

Dr. L. G. Noel reported that a small edition had been printed and distributed, copies having been sent to every member of the Southern Branch, to the officers and Executive Committee of the National Dental Association, to the editors of the different dental journals, etc. The present edition is about exhausted.

On motion of Dr. Vignes, the committee was continued and authorized to publish another edition when required, and to embody in the new edition as much of the amendments adopted by the National Association as may be necessary to keep the two Constitutions in harmony.

The Committee on the President's Address presented their report, which was discussed briefly by Drs. Foster and Crawford, and, with the address, referred to the Publication Committee.

The hour for selection of time and place of next meeting having arrived, Dr. Walker offered the following resolutions, which were unanimously adopted:

WHEREAS, The Constitution of the National Dental Association and the Constitution of the Southern Branch of the National Dental Association provide that the annual meeting of the Southern Branch shall be omitted the year that the main body meets in this division; therefore be it

Resolved, That the Southern Branch of the National Dental Association shall omit its annual meeting in the year 1900. Be it further

Resolved, That the Southern Branch shall hold a special business meeting at the same place and one day preceding the annual meeting of the National Dental Association in 1900, for the purpose of considering suggestions for the revision of the Constitution, for the payment of debts, for the reception of delegates, for the collection of dues, hearing reports of business committees, election of officers, and selection of place of next annual meeting and such other business as may come before the Association at that time. Be it further

Resolved, That at this special business meeting of the year 1900 there shall be no scientific papers or discussions of any matters other than of a business nature.

The resolutions were unanimously adopted.

ELECTION OF OFFICERS.

Only one nomination was made for each office. The rules were suspended, and the Secretary authorized to cast the unanimous vote of the Association for each officer, respectively, as follows:

President, Dr. Thos. P. Hinman, Atlanta, Ga.

First Vice-President, Dr. H. H. Johnson, Macon, Ga.

Second Vice-President, Dr. J. P. McDonald, Shelbyville, Tenn.

Third Vice-President, Dr. Sam G. Duff, Greenville, Texas.

Re-elected:

Corresponding Secretary, Dr. C. L. Alexander, Charlotte, N. C.

Recording Secretary, Dr. S. W. Foster, Atlanta, Ga.

Treasurer, Dr. B. D. Brabson, Knoxville, Tenn.

Drs. J. G. Fife, Waco, Texas, and A. R. Melendy, Knoxville, Tenn., were unanimously elected to serve three years on the Executive Committee in the places of Dr. W. R. Clifton and H. E. Beach, whose terms expire with the present meeting.

The Treasurer presented the following report, all bills paid having been duly audited by the Executive Committee:

TREASURER'S STATEMENT.

Expenses—

Paid Mrs. Walker	$100.00
" Dr. Walker	17.00
" Dr. Bauer, Joint Exp.	40.15
" Dr. Alexander	42.00
" Dr. Foster, Sec., part salary	25.00
" Dr. Brabson, Treas. Exp.	39.50
" for badges	4.85
" S. S. White Co.	5.00
	$273.50

Receipts—

Cash on hand	$68.49
" received from old members—44, each $5	220.00
" " " new " —22, " $5	110.00
" " " 1 new National	2.00
" refunded by Tr. Natl. overpay	6.00
	$406.49

Total receipts	$406.49
" expended	273.50
Balance on hand	$132.99

To be expended—

Balance due Foster	26.40
Due Natl. Ass'n	198.00
" Dr. W. E. Walker	

The report was accepted and ordered spread upon the minutes.

Dr. H. J. Burkhart addressed the Association on the subject of the coming meeting of the National Dental Association at Niagara Falls, showing the advanced stage of arrangements for the meeting. His remarks were received with applause.

The following resolutions were unanimously adopted:

Resolved, That the Southern Branch of the National Dental Association, in annual session convened, does hereby tender a vote of thanks to the Louisiana State Dental Society and especially to its President, Dr. Jules J. Sarrazin; to those members of that society constituting the Committees on Hotels and Quarters, on Arrangements, Entertainments, and Invitations, for their very successful efforts in behalf of this meeting; to our honored guests who, as essayists and clinicians, have contributed so largely to the success of this meeting; and especially to Mr. Samuel P. Cowardin for the valuable collection of microscopic slides placed on exhibition; to the

hotels, boarding houses, and private families of this city for their liberality in the matter of rates during this, the Carnival season; to the Harmony Club, the Young Men's Gymnastic Club, and to the Hon. William Beer, Librarian, for courtesies extended.

The minutes were read and approved.

Drs. J. Y. Crawford and L. G. Noel were appointed to conduct the officers elect to the platform, and they were duly installed in office.

Dr. Hinman, the President of the Association, having received the gavel from the retiring President, took the chair and called for the reading of the final minutes, which were duly approved.

The Association then adjourned to meet in special session in 1900, at the same place with the National Association, and one day earlier; time and place to be announced in the dental journals.

S. W. Foster, *Recording Secretary.*

IN MEMORIAM.

YOUR committee appointed to prepare and present to the Southern Branch of the National Dental Association resolutions on the death of our late brother, Dr. R. Finley Hunt, submit the following:

WHEREAS, Information has reached this Association that our distinguished brother died at his home in Washington, D. C., May —, 1898. It is with sincere sorrow and regret that we have heard of the loss of this faithful and loyal member of our profession (the memory of his many virtues and good works alone remains with us), who by his virtues, his social qualities, his great abilities and high-toned sentiments had endeared himself to all who knew him;

Resolved, That underneath the blunt man (not always understood) were to be found a loving human heart, sensibilities of unfathomed depth, a soul devising the most generous deeds and capable of the sublimest of all virtues,—justice and impartiality;

Resolved, That in the death of Dr. Hunt we are taught

"'Tis not all of life to live
Nor all of death to die,"

and passing, he has left a memory and an upright example that will not perish;

Resolved, That we extend to the profession of Washington and to the family of the deceased our sincere sympathy;

Resolved, That a copy of these resolutions be forwarded to the family of the deceased and spread upon our minutes.

Respectfully submitted,

HENRY W. MORGAN,
A. R. MELENDY,
T. C. WEST.

Address of Welcome.

By the Hon. W. C. FLOWER, Mayor of New Orleans.

MAYOR FLOWER said that it afforded him a great deal of pleasure to greet all of the members and to extend to them a cordial welcome to the city. It did not require any formal words to assure them that all of the courtesies and hospitalities of the city are extended to them. In fact, he said he doubted whether anything could be added to intensify the warmth of the welcome extended to the visiting members by their colleagues of the profession in this city. Mayor Flower referred to the beneficial results produced by conventions of this kind, as they always lead to something better, higher, nobler, and grander. He said that the sights presented in the city at this time are not those of the model New Orleans; the city is now undergoing its period of transition, and *the grub* is presenting its very ugliest aspect; the city is, as it were, in its working clothes; its streets are torn up for the underground laying of its wires, and for the laying of a drainage and sewerage system, and for other works of general improvement, which will be completed and ready to present New Orleans in a beautified, adorned, and healthful condition to visitors when they return here another year. With due allowance for these unavoidable conditions, he trusted that the visitors would enjoy a full meed of pleasure during their sojourn here, and derive great profit from the deliberations and proceedings of this convention, and that they will carry back to their homes only pleasant memories of New Orleans.

Address of Welcome.

By JULES J. SARRAZIN, D.D.S.,
President of the Louisiana State Dental Society.

Officers and Members of the Southern Branch of the National Dental Association: My dear colleagues, like tributaries of this great river which runs its powerful current at our doors, so do the State dental societies all over the country pour their best representatives into the great thought body of the National Association, and we, who stand by the flow of that tide to absorb its beneficent moisture for a while, cannot but feel grateful for the good fortune which is our present lot.

Nothing could be more natural than for the capillary to open its walls to the contents of the larger vessel. Nothing could be more pleasing than the coming of the parent to the child. Indeed, it requires three distinct professional births for one to become a mere cell in this great body of the Southern Branch of the National Dental Association,—a college birth, a State society birth, and a delegation birth to this body. In this sense, truly this Branch of the National Association is the parent of all State societies from which it accepts its members. And can the parent ever come to the child to encourage its labors without the child's heart overwhelms with joy?

One year and a half ago the two great dental associations of this country blended, and emphasized a fact that war has since brought out in still bolder relief,—the fact that State lines exist no longer in the hearts of men of this country; the fact that South, North, East, and West have become one great and potent whole, undivided and united,—not by laws, but by love; by love for country, in a word,

by patriotism, which had been drowned in the torrents of immigration for one century.

The Louisiana State Society speaks welcome to the Southern Branch of the National Association. It speaks it to the National Association also. It speaks it to all here present, and regrets that every dentist in the country is not here with us that he might also hear it.

And at this initial stage of these proceedings, and of the work which we have convened to perform, we may borrow from Milton and truly say,—

> "Thus we salute thee with our early song,
> And welcome thee, and wish thee long."

Response to the Addresses of Welcome.

By Dr. R. K. LUCKIE, Holly Springs, Miss.

Mr. President, Ladies and Gentlemen: Freed from the tiresome routine of the office and from the constant care and anxieties of business life, we come gladly, yea eagerly, to refresh ourselves once more in the loved assembly of friends and brothers.

As a member and representative of the Southern Branch of the National Dental Association, it has fallen to my lot and become my duty to acknowledge and make response to the graceful, kind, and cordial welcome that has fallen from the lips of the distinguished Mayor of New Orleans, and from the accomplished gentleman who represents the Louisiana State Dental Society, an organization which he both honors and adorns.

We feel and we know that they have reflected the feelings and sentiments held and cherished for ourselves by the brotherhood of our loved, our bright, and ever charming South-land.

Among the incidents and episodes of professional life a convention or convocation of dentists, inspired by a common impulse and animated by a common purpose, will always be not only refreshing and enjoyable, but refining and elevating, strengthening and ennobling; but with the circumstances that distinguish the present occasion, the splendid welcome accorded by Louisiana, by New Orleans, her great commercial emporium, and by our own special fraternity, we are well-nigh enchanted, though not surprised, for we already knew the South,—we knew its magnanimity, its hospitality, its proud chivalry, and its unmatched and unmatchable kindness and courtesy.

Gentlemen of the Louisiana State Dental Society, our eyes are

brightened, our hearts are warmed, and our pulse-beats quickened, and our resolves to press on and up to the topmost plane of professional progress and advancement find aid and inspiration in our present surroundings and in this dignified and fraternal presence.

We wish that we could command words with which to give expression to our estimate and appreciation of the welcome we have received from a great city and a grand and noble people; a welcome not only to your hearts and hearthstones, but to scenes and associations of historic interest and of national magnitude and importance.

Our memories are quickened and our minds impressed by what we have already experienced, and by what we anticipate in the transactions we are now inaugurating; and you may feel assured that while enjoying your courtesy and kindness we will gladly share your efforts and labors in the promotion and advancement of a common interest and calling, and rejoice in the triumphs that may reward your fidelity and devotion to a beneficent and honorable profession.

Some of us have had a hard time getting here. It was hard to cut loose from business so long as there was a dollar in sight, these close times; hard to feel that we could spare even a few days, notwithstanding it was for such a good cause; yet in the face of every difficulty we are here, and as the mind fondly lingers on the glad welcome which has just been extended to us in such glowing and eloquent words, we feel that already are we doubly paid for making any sacrifice to come to this meeting in this delightful place.

We have left our homes and our loved ones to bear to this assembly whatever of contribution Providence has placed at our disposal as a free-will offering upon the altar of professional faith and worship, feeling, yea knowing, that we shall receive and bear back a dividend upon our investment that will more than compensate our sacrifices, reward our labors, and leave us rich in new attainments, in increased and added resources, in fresh, sparkling gems and pearls of knowledge; rich in a new and bright illumination for our guidance along the pathway of future research and advancement, and rich in the esteem and approval of our co-workers and fellow-craftsmen.

Mr. President and members of the Louisiana State Dental

Society, we want to say that the Southern Branch of the National Dental Association congratulates itself upon the selection of New Orleans as a place for our anniversary meeting. We can imagine no other city or town or locality that could so perfectly fill all the conditions and requirements of a successful, charming, and most profitable reunion.

Here we strike your grand, majestic river, the matchless old Mississippi, flowing past you, ever onward to the sea, in its strength and glory; a river in itself a wonder, a marvel, and a revelation to many of us; an inland sea, bearing upon its bosom the treasure-laden argosies of every land and clime.

Here we find a city of two hundred and fifty thousand souls, resting quietly upon the shore of the great Gulf of Mexico.

We find centering here seven great trunk lines of railroads, representing forty thousand miles of steel rail.

We find that you have here three thousand manufacturing establishments, with an annual output of one hundred million dollars.

Here we find the largest cotton market in the world; the finest quarantine station in the world.

Here we find the stimuli and energy of a world-wide trade and commerce; we find a soft, balmy climate, and a wealth of fruits and flowers that would adorn and glorify a second Eden.

Here we find wealth, health, music, and beauty, and, to cap and crown the distinguishing characteristics and environments of your "Crescent City," we find a proud array of gallant, chivalrous men and a more imposing and resistless array of lovely women, peerless in their matchless grace and radiant beauty.

In this day of marvelous national development and expansion, in this hour of the dawn of a magnificent commercial enlargement, no one may overdraw the possibilities of this commercial gateway of the tropic seas, with the stupendous project of the canal from Gulf to Western ocean, opening up the ocean's highway for the world's commerce through beautiful Nicaragua, thereby bringing us in closer touch with the isles of the Philippines and, farther to the west, with the countries of the Orient.

We say that no imagination can picture the value of this grand port and outlet to our Southern land and to our common country. It is peculiarly meet and fortunate that we may hold our annual assembly in a city noted for the culture and refinement of its inhabi-

tants, for its educational and benevolent enterprises and institutions, its splendid university, and its grand charities.

Some of the most distinguished men America has yet given to the world—scholars, physicians, surgeons, ministers, jurists, and statesmen—here have lived and caught their inspiration and achieved their renown in this famed and favored Southern city; and here we find our special department of general science not only fully recognized, but brilliantly illustrated in the practice of representative men "to the manor born," or sons by choice and adoption.

We do not regard it as invidious or unjust to others when we assert that in no section of this or any other country can be found finer examples of scientific and artistic dentistry than are wrought and illustrated by our brotherhood of New Orleans.

But apart and aside from the many other attractions and advantages presented by your charming city, there is another element of interest and gratification to be found in recalling some of your local traditions and historic incidents.

Here in the long ago the flags of old Spain and of France were unfurled by the adventurous pioneers, explorers, and searchers for gold, for treasure, and for the fabled "Fountain of Youth."

Here was planted a colony that for long years acknowledged fealty and paid tribute to the monarchies and despotisms of foreign lands, as well as to the ungoverned and lawless freebooters that infested your river and neighboring waters. The colony grew, became an important military and naval station, and ultimately passing from the control and government of European powers, by purchase from France, its last foreign owner, was, with its vast territorial domain, erected into a State and became a member of the American Union.

With a wealth of soil and production rivaling the delta of the Nile, with its tropical and sub-tropical fruits and flowers, and its great staples, corn, cotton, sugar, and molasses, Louisiana and its chief city soon became the focal center of a commerce that fixed its impress and ægis upon the political economy and social conditions of our civilization; and, while dominating the marts and markets of the earth, has to this day given commanding power and prestige to our common country in all its relations and connections, commercial, civil, social, and political, the world over.

That such a State and such a city should excite the envy and

cupidity of hostile nations, or that their invading armies in time of war should be attracted by the hope and promise of capture and spoil, is not remarkable or surprising.

An incident in your history which for years startled and even bewildered the nations of the world was the battle of New Orleans, January 8, 1815, when the hitherto invincible hosts of Wellington's veteran soldiers, marching to the battle cry of "Booty and Beauty," went down before the prowess of Southern woodsmen as autumn leaves go down before an autumn storm.

Modern history records no grander example of true courage than was illustrated upon the field of Chalmette. Modern history records no grander victory than was gained by Jackson upon the field of Chalmette. And why such a victory? Because the Tennesseeans, Kentuckians, Mississippians, Louisianians, and all who had the honor of fighting for America's cause on that memorable day remembered the command of their gallant leader, "Stand to your guns; don't waste your ammunition; see that every shot tells."

The American soldiers did stand to their guns on that victorious day, and their marksmanship received the commendation of the great Napoleon. When all was over, when the last shot had been fired and the scurrying smoke had left the bloody field, it was found that two thousand six hundred of those fine, brave, smoothly-shaven soldiers of the king of Great Britain, our cousins in blood and tradition, had kissed the earth, and with them fell the gallant Packenham, Gibbs, Keane, the brave Major Wilkerson, whose dying words were, "Tell my commander that I fell upon your parapet," and many other British officers; while on the American side only eight men were killed and thirteen wounded.

One of the happiest and most exciting days in the history of your lovely city was when the young Creole came dashing in from the field of Chalmette crying aloud "Victory! Victory!" announcing that Packenham had been defeated, and that your lovely city was saved from British possession and British pillage.

While these reminiscences and memories bear no special relation to the present occasion or its objects and purposes, they yet lend zest and interest, and we trust some inspiration in and for the work before us; and, moreover, the name and fame of Andrew Jackson and his heroic riflemen, who, against such fearful odds, such over-

whelming numbers, saved your beautiful city from loot and pillage, should ever be held in fond remembrance and be kept fresh and green by the sons and daughters of the South. There never was a time in the history of this government when the American soldier failed to distinguish himself upon the field of battle.

This is a great country, a great nation. When it was decided that we should come into hostile array with the arrogant and boastful Spaniard, with the proud representatives of the land of the Alhambra, of Ferdinand and Isabella, what was the result?

Almost in the twinkling of an eye we had appropriated fifty millions of dollars for the necessary war preparations. Almost in the twinkling of an eye we had organized and equipped an army of two hundred and fifty thousand brave men, who came from every section of our country, from every State of our Union, from all the vocations of life; men of all classes and conditions, the cultured and the uncultured, the rich and the poor, offered their money and their lives for our country's cause.

Our navy was strengthened. American first-class battleships, protected and armored cruisers, monitors, gunboats, and transport vessels were covering the seas in two hemispheres. And while there was some reason why this mad rush to arms should not have been made, still the unanimity with which our people acted was amazing and gratifying in the highest degree.

Party and sectional lines were well-nigh obliterated, and to-day the American people are in a closer bond of patriotic union than they have ever been before. We have forgotten almost everything of the past excepting our national glory, and it has come to be seen that much of the old misunderstanding and the prejudice and the old bitterness have disappeared, and that we now love and honor alike the one national flag; and may it float proudly and peacefully not only over these United States, but over our newly-conquered islands of the sea.

In the short space of three months battles were fought on either side of the globe, and great victories won. The masterly stroke of Dewey in Manila Bay, the determined action of our men at El Caney and San Juan hill, which was either to die or to conquer, and the complete destruction of the Spanish fleet around the mouth of Santiago's harbor, is only characteristic of what American seamen and soldiers can do.

All honor to America's navy, which now ranks alongside of the great navies of the world, and which will henceforth act as a potent factor in affairs of the sea the world around!

All honor to America's regular and volunteer forces! All honor to American energy, skill, adaptability, and confidence, which is sufficient to overcome all difficulties!

All honor to President McKinley and his wise counselors! All honor to the loyalty and patriotism of Lee and Wheeler, the daring deed of Hobson, and the blood of our dead heroes!

The war with Spain, the proud old monarchy, redolent with the memories of a glorious and chivalrous past, has acted as a thunder storm to our civilization, clearing the atmosphere and giving our War and Navy Departments and our representative men a keener insight into our national and international affairs; thereby our Government has been placed upon a higher, broader, and a safer plane than ever before, and indelibly stamped as a *hero nation* among the great powers of the world.

In this great country, amidst war and pestilence, the dental profession moves steadily on, never halting, never hesitating. Our progress in all the departments is well marked and encouraging.

Only a few years ago we were hardly known as a profession; to-day we are not only fully recognized, but it is believed by many that there is no profession that is more important or doing more good than the one we represent here to-day.

We feel, Mr. President and fellow-members, that we hazard little in assuming and asserting that in no part of the civilized world has the science and art of dentistry (or, if you prefer, oral or dental science and art, as we do not yet feel like calling it stomatology) been more earnestly and sedulously cultivated or more skillfully or successfully practiced than in our own age and country; and it is neither arrogance, egotism, nor vainglory to claim that the dentists of the South are holding up their end of the line, touching elbows and marching abreast with their brotherhood in not only every other section of our country, but with the foremost of all the lands abroad.

This assembly of representative men from Louisiana and every other Southern State evidences our interest and our loyalty to an honorable and beneficent calling.

Surely it must be a pleasant thought for those who have borne

the heat and burden of the day, who have labored with heart and hand for the good of our loved and honored profession, to look backward and feel that their labors have been rewarded; to look forward and realize that the open sky is upon us, the perfect dawn of our day of prosperity foretells the brightness of our future as a profession.

Let us be *true* to ourselves and loyal to our profession; loyal to a profession which to-day is an honor to our civilization and a blessing to humanity.

We feel, Mr. President, that we voice the sentiments of at least the members of the Southern Branch of the National when we say we *will be loyal* to our profession; and we will be found to the last holding aloft its banner, that is so sacredly enshrined in every one of our hearts.

Mr. President and members of the Louisiana State Dental Society, allow us, in conclusion, to thank you again for your grand reception and for your cordial welcome, and to invoke upon this anniversary meeting the largest possible measure of success and profit to us all; and for *yourselves especially* a continuance of that prosperity and good fortune that has distinguished your past, and that forecasts and presages a future even more bright and beautiful, more grand and imposing.

[Dr. Luckie's strength failed him before the close of this eloquent address, and he was compelled to retire from the hall. The President of the Association expressed his regrets at the unfortunate occurrence, and said, "My name was placed on the program simply as a substitute in case Dr. Luckie's strength should fail him. Dr. Luckie's physical development has unfortunately not kept pace with his splendid intellectual and spiritual forces. We have witnessed with sorrow his inability to bring to a close the soul-stirring, patriotic address to which we have listened. But, judging from what we have heard, he can have left but little unsaid. That little I do not dare attempt to supply. I will therefore proceed at once with the customary annual address."]

Annual Address.

By WILLIAM ERNEST WALKER, D.D.S., President.

FELLOW-MEMBERS of the Southern Branch of the National Dental Association, Ladies and Gentlemen:

When, a year ago, you conferred upon me the highest honor within your power to bestow, the Presidency of this, our loved Association, I accepted the trust with justifiable pride in being so honored by you, but also with a realizing sense of the great responsibilities intrusted to me. When my able predecessor placed this beautiful gavel in my hand he had just said that in working for a successful meeting he had labored as he had never labored before in all his life. I also can truly say that the past year has been one of labor, earnest and unremitting. I have used my best efforts in endeavoring to build up this Association; to increase its membership; to secure valuable papers and exhibits, and to insure in all respects a successful meeting. Guided and aided by our trusty Treasurer, together we have gone out into the highways and byways seeking for the stragglers, rousing the listless, awakening the sluggard. Through these efforts no less than thirty valued members of the Southern Dental Association, who for various reasons had wavered in their allegiance, have been brought back into the fold. My zealous coadjutor, Dr. Jules J. Sarrazin, the worthy President of the Louisiana State Dental Society, whose guests we are to-day, has worked as probably no State society president ever worked before, and with his noble corps of local committeemen has spared no efforts to provide for our entertainment, both social and scientific. What the result may be remains to be seen; the program promises well.

Our meeting of last year, successful as it was in many respects,

was held under unusual and peculiar circumstances; it was experimental in various ways. The twenty-ninth annual meeting of the Southern Dental Association was also our first meeting as the Southern Branch of the National Dental Association.

The constitution of the Southern Dental Association was still in the hands of the committee appointed to make such revisions as should bring it into harmony with the constitution which we had adopted at Old Point Comfort for the National Association, of which we had become a branch.

Very few among us had at that time more than a very meagre knowledge of the provisions of the constitution of the National body, owing to the fact that it had not been generally distributed in the Southern States. I, myself, although one of the secretaries of the National Association, had not at the time of our St. Augustine meeting received a copy of the constitution adopted at Old Point Comfort, nor had Dr. L. G. Noel, Chairman of the Committee on Revision; and I know of but one member of the Southern Branch who had, and that one copy Dr. Noel discovered and secured as a guide in his revision of the constitution of the Southern Dental Association.

It was due to this limited circulation of the National constitution among Southern members that there were no delegates sent to our meeting of 1898. During the five months which intervened between the Old Point Comfort and the St. Augustine meetings but one State society (Florida) from which delegates could have been received had held its annual meeting, and it elected no delegates, not having received the constitution of the National, no notice having been published in our monthly journals making known the fact that delegates to the National and its Branches could not be accepted unless *elected by State societies* at their regular annual meetings.

Early in the meeting, before the revised constitution had been adopted, or even presented by the Committee on Revision, three new members were "elected" according to the provisions of the old constitution, under which we were still operating; but when the proposed constitution was read it was seen that the provision for the admission of new members was radically different from what had obtained before, and therefore the applications for membership, of which there were a number, were rejected.

The revised constitution then adopted has since been printed and mailed to every member of this Association, and also to many of the more prominent members of the National Association, officers of the different State dental societies, and editors of the dental journals.

It is very important, in view of the relations which we as a Branch sustain to the National body, that the provisions of our constitution (which harmonizes in all essentials with the National constitution) should be clearly comprehended, that our rights may be recognized, our obligations understood, and our privileges appreciated. Subsequent to the St. Augustine meeting, fearing that these features of our revised constitution might not be clearly understood, I, as President of the Southern Branch, prepared a circular letter defining the delegate feature, and calling attention to the importance of the election of delegates by every Southern State society.

Immediately preceding the date of the annual meeting of each State society, as far as I could ascertain, I addressed a copy of this circular letter to the officers and a number of prominent members in each State society within our territory.

That my apprehensions were not groundless is evidenced by several facts. First, a number of State societies failed to make any provision for delegates, either to the Omaha meeting or to the present one; second, other societies, while duly electing delegates, elected men who were already permanent members of the National Association, thus defeating the sole object of the delegate feature, —viz, the increase of membership.

The membership of the Southern Branch is drawn from nineteen States and Territories, in which, according to the latest edition of Polk's "Dental Register," there are enrolled over six thousand members of our specialty. At the Omaha meeting thirteen of these nineteen States were not represented by delegates, and from the other six States only ten delegates registered, seven of whom were already permanent members of the National, two of whom were members of the Southern Branch. Of the three delegates who were not already permanent members, and therefore might have become new permanent members, only one signed the constitution, so that the National has but one new member in the South as the result of the Omaha meeting. As a Mississippian, I am proud to

say that this solitary individual is a member of my own State society, Dr. P. H. Wright, of Oxford, Miss. Now, I ask you in all sincerity, is this fulfilling our obligation to the National Association? Is this showing due appreciation of the privileges that are ours?

There exists an opposition to the Branch feature which has thus far prevented the organization of Eastern or Western Branches; in fact, this feature was incorporated in the constitution chiefly as a means of effecting a consolidation of the American and the Southern Dental Associations. In the words of President Fillebrown, in his annual address at Omaha, this plan alone "made the National Association possible, bringing into harmonious action and sympathy the sentiments and energies of a reunited profession."

It remains, therefore, for us, the Southern, and thus far the only, Branch, to justify President Fillebrown's prophecy of the "practical and successful working of the plan" by repetitions of the success of our last meeting; by adding to the membership more of the best men in the South, and by contributing to the volume of Transactions only such material as shall aid in "the increase of scientific knowledge, the advancement of professional interests, and the promotion of the welfare of humanity."

On an occasion similar to the present my honored *confrère*, Dr. J. Y. Crawford, used the following words: "The object of the labors of this Association should be to encourage advancement along the lines which promise the most good to the greatest numbers. The nation's health and longevity is the question at issue, not the making of money by a favored few. The practical application of dental surgery and dental science is a national necessity."

As pertinent to this thought I desire to say a word on the subject of

DENTISTS IN THE ARMY AND NAVY.

At our last annual meeting a committee was appointed to work in the interests of legislation in the matter of the appointment of dental surgeons to the army and navy. The subject was also brought before the National body at its meeting in Omaha, and a committee appointed "to take charge of and have full control of the subject of legislation in this direction." A resolution was also adopted deprecating any independent action in the Congress on the part of other societies or individuals.

I need not dwell upon the importance of the subject. Our soldier heroes on the battlefield, in the camp, in the hospital, the men on board our war vessels, bear witness that the hardships to which they were subjected were too often aggravated by the suffering incident upon neglect of oral hygiene. Dr. Nicholas Senn, lieutenant-colonel in the United States Volunteers and chief of the operating staff with the army in the field, in his report on the surgery of Camp Wikoff, says, "Of the organs frequently affected among the returning soldiers were the teeth. Patients suffering from carious aching teeth were numerous. In most instances they presented evidences of serious malnutrition following disease and exposure; suppurative alveolitis was less frequent. Infection of many oral cavities showed that teeth had been sadly neglected during the campaign. . . . I did all I could in the way of conservative dentistry by cleaning out the cavities and packing with cotton saturated with carbolic acid, but in the majority of cases the patients returned and insisted on having the painful teeth extracted. . . . Much has been said in favor of attaching a dentist to each regiment to look after the teeth of the men, and the observations made in Camp Wikoff tend to support the propriety of such a much-needed addition to the medical service." (*Jour. Am. Med. Assn.*, November 26, 1898, p. 1299.)

THE EDUCATION OF THE PUBLIC.

A topic worthy of your earnest consideration is that of the education of the public to an appreciation of the teeth as essential portions of the general economy; of the importance of preserving them in *all* their integrity and the means thereto.

Individual instruction from the chair, while doing much good, still reaches only those who already have a certain degree of knowledge or appreciation along these lines. What is needed is to reach people before it is necessary for them to visit our offices, and thus teach them by what means they may avoid the necessity of operative procedures.

The most feasible plan thus far suggested appears to be through the children in our public schools. In Mississippi, Alabama, and Texas an effort is now being made to secure the co-operation of the State medical societies and the State school superintendents in enforcing an addition to the curriculum of either a special primer

on oral hygiene or an addition to the text-books the use of which is already compulsory. I submit this idea for your consideration, with the hope that the plan may be encouraged by receiving your indorsement.

LIFE INSURANCE EXAMINATIONS.

A no less important matter is that of the examination of the mouth by the medical examiners of life insurance companies, a subject which has been discussed by this body. At our last meeting our Corresponding Secretary was instructed to initiate a correspondence with the officials of the leading life insurance companies of this country in an effort to ascertain their views on the subject.

We look forward with interest to his report upon the subject, as its importance is of vital interest. The condition of the teeth in its bearing upon the general health constitutes such an important factor in all calculations of longevity that it is strange it should have been so entirely overlooked in the matter of life insurance examinations.

THE JOURNAL.

I beg to enlist your interest and co-operation in the plan under consideration by the Association of which we are a Branch, looking to the establishment of a journal which shall be the official organ of the dental profession; a journal in which shall be published the Transactions of the National Association and its Branches, and other original matter pertaining to dentistry and the collateral sciences. At the meeting of organization, at Old Point Comfort, in 1897, a resolution was adopted to this effect, Drs. John S. Marshall, J. Taft, and L. G. Noel being appointed a committee to investigate the subject. The report of this committee presented at Omaha by the chairman, Dr. Marshall, gave evidence of thorough investigation on various points, especially as to ways and means. The committee was continued for another year, that they might work out the details of a scheme by which the committee thinks this very important work may be established and carried out. Their forthcoming report is looked forward to with interest, and there is no doubt that in such competent hands the object will be accomplished. But the project is one that demands and deserves the support and co-operation of every member of this body, and I therefore beg to direct your attention to it.

In conclusion, allow me to refer to the difficulties I have encountered during the past year, in my efforts to get into communication with the different State societies at about the time of their annual meetings, the object in view having been to impress upon the officials of each society, just at the right moment, the importance of electing delegates to the National Association and its Branches. I found a difficulty in ascertaining the names and addresses of officers, or the time and place of meeting. I therefore beg to recommend that a request be officially made that the Corresponding Secretary of each State society forward immediately after each annual meeting the name and address of the officers, and also the place and time of the next meeting, to the Corresponding Secretary of the National Dental Association (Dr. Emma Eames Chase, 1334 Washington avenue, St. Louis, Mo., being the present incumbent), and also to the Corresponding Secretary of this body. This would greatly facilitate the work of these officials, and would be duly appreciated.

Report of Special Committee on President's Address.

FIRST. We commend the efforts of the President and Treasurer in securing renewals of members in arrears, thirty renewals of this class being reported for the year.

Second. We heartily commend his plan for keeping in touch with the State associations,—viz, by correspondence at the proper time,—the matter of delegates from State societies being of the utmost importance to both the Southern Branch and to the National Association.

Third. Education of the public. We would emphasize and indorse plan suggested.

Fourth. Life insurance examination. We would commend this point; recommend that committee on same be continued and urged to greater effort in this field.

Fifth. We feel that the suggestion of an official journal is an all-important one, and urge that this body extend to the committee on this subject our sympathy and support.

Sixth. In conclusion, we commend all of the points made in this address as important, to the point, and worthy of our serious consideration. We regret that we have not been given time to properly consider and report more at length. We feel that the thanks of this Association are especially due to Dr. Walker for his tireless and unusual efforts in behalf of this meeting, sparing neither time nor expense, a fact which we know has impressed every member, and has so impressed your committee that we cannot refrain from mention of it in connection with this practical and most admirable address

Respectfully submitted,

A. R. MELENDY,
I. SIMPSON,
T. L. WESTERFIELD.

DISCUSSION.

DR. J. Y. CRAWFORD: I am glad that our President has called our attention to the important matter of the examination of the oral cavity for life insurance. There is nothing that could come before us that is more deserving of our attention. It is a matter of interest to the entire population, as through the adoption of this idea they would obtain cheaper insurance.

DR. WM. ERNEST WALKER (the Vice-President in the chair): Mr. Chairman, I think it would be of interest to this Association if Dr. Crawford would explain how this idea, if carried out, would secure cheaper insurance for the people. It is self-evident to a business mind, but there may be some among us who do not seize his idea, and I think it would be productive of good if Dr. Crawford would enlarge upon that point.

DR. CRAWFORD: I am glad to be called out on this subject. I do not think we could devote too much time to its consideration, as it is from the discussion of such matters that the National Dental Association is to be enabled to benefit the American people. If this great country of ours is to make the progress which it should, in taking advantage of the privileges of civilization, the time will come—and that time is not far distant—when the people of this country will feel it a disgraceful stigma to be declared physically imperfect. If I had a son—but I have none—who had reached the period of manhood, and in time of necessity was not anxious to assume the rôle of a soldier for the defense of his country, I would want to disown him; and if that son was deprived of the privilege of enlisting as a soldier because of any physical infirmity it would make me think something was wrong; it would make me feel bad. No man is proud of having been rejected by a life insurance company. When a man is going to be examined he generally does it very quietly, and does not want to let anybody know it, for fear he might be rejected, a fact which he would not want any one to know. When I am going to be examined for life insurance I always tell the examiners and the agent that if there is any probability of my not being accepted, please not to examine me, *for to be rejected would make me feel bad!* What a ridiculous state of affairs it is that if a man has a slight impairment in his powers of hearing the insurance companies reject him; if he has a slight imperfection in one of his eyes the insurance companies

reject him; if he has a fistula in ano the insurance companies reject him; but he may have a dozen fistulas in the oral cavity, and they give them no consideration whatever. And yet there can be no question as to the deleterious effect of the constant formation and swallowing of the pus from these openings into the mouth. One inquiry by an insurance company into the condition of a man's oral cavity would do more to elevate dentistry than crown- and bridge-work has done for prosthetic dentistry. It would do more to impress the people with the importance of our calling than anything that could happen. It is even of more importance than the subject of the appointment of dentists in the army and navy, though we all admit that is of prime necessity. When a man knows that there is danger that his son may be deprived of the benefits of life insurance on account of the condition of his own oral cavity, he will realize, as never before, the importance of caring for his dental organs, and they will receive that care and attention which they deserve. When the insurance companies begin taking into consideration the condition of the oral cavity, some people who are now deprived of life insurance will get the benefit of it; when the insurance companies reject or charge a higher rate to those who have diseased oral cavities they will have a lower rate of mortality, and will be able, therefore, by a mathematical process, to give insurance at a lower rate to many families who are now deprived of it, and they will receive all the benefits of this great blessing.

Dr. S. W. Foster: On account of limited time, and since the address is so complete within itself, I move that the address, with the recommendations from the committee, be referred to the Publication Committee for publishing with the Transactions.

Carried, and subject passed.

Orthodontia and Oral Surgery.

Report of Chairman of Committee, GEO. E. HARDY, M.D., D.D.S., Baltimore, Md.

Mr. President and Gentlemen: As chairman of your Committee on Orthodontia and Oral Surgery, we will in this report mention both subjects in a general way, and hope that these remarks will open a discussion that may lead to new thoughts and call forth some interesting ideas from members.

Among the literature on the subject of orthodontia published this past year, Dr. Farrar's second volume of his great work is the most noteworthy. This is truly a masterpiece, and a fitting sequel to the first volume published some years ago. On these two books hang all the laws of regulating. They are the most comprehensive and complete treatise on orthodontia ever written, and show what a man may accomplish by applying himself to a specialty.

To make a success of this branch of dental science one must be a specialist. We should all have a general knowledge of the subject, and, in fact, should thoroughly understand the theory and practice of regulating, but the busy "general practitioner" of dentistry, if he has a good practice, is too busy a man to accomplish much in this line.

To take an impression, look over the models, turn them over with a few general directions to your assistant or mechanical man for him to devise, construct, and apply apparatus, is no way to regulate teeth. The doctor must give his undivided attention to the study of the models and of the patient. Not only decide what he wishes to do with the teeth, but what he has to contend with in the mechanical and anatomical surroundings, as well as in the peculiarities of the patient's disposition. He must control the

patient as thoroughly as the appliance, and understand his character fully as well.

After the apparatus is constructed and applied, our troubles begin. "Eternal vigilance" is the price of success in regulating. Watch the appliance, watch the anchorage, watch the tooth to be moved, watch the tooth *not* to be moved, and watch the patient, to see that the whole appliance is not removed from the mouth as soon as he reaches home. To do this faithfully will consume a great deal of time, and, as I said above, this work should be in the hands of some one who is willing to give his whole life to it.

The most difficult kind of operation in my practice has been the one for retracting the six anterior teeth without tipping posterior teeth forward. After trying the Jackson method, the old rubber plate, the bands soldered together and cemented on, making posterior teeth practically a compound tooth, all with bad results, I have concluded that unless patient will consent to wear Angle's head-gear, to promise only bad results in such cases. It is very discouraging. Can any one here help us solve this problem?

Among the shorter articles published during the year the one by Dr. S. H. Guilford, of Philadelphia, in the *Dental Cosmos* for December, deserves special mention. He directs our attention to some of the fundamental principles involved in a most practical way.

The articles written by Dr. Kells, of this city, published and illustrated in the *Items*, are also very interesting and instructive. They show the adaptability and practical application of that greatest of wonders, the Roentgen rays, to this branch of dental science.

That the skiagraph is of inestimable value in certain cases is fully shown in these articles.

The "artistic treatment of natural teeth," as practiced by Dr. Younger, of Chicago, Dr. Payne, of New York, and others, is a move in the right direction. The results obtained by the artistic sculpturing, carving, and remodeling of badly formed teeth would astonish many of us here to-day. To be successful in this line of orthodontia we must, of course, be artists enough to take in the whole facial expression. Every feature must be studied and its relation to the proposed change of shape of teeth considered. I hope Dr. Younger, who I believe is with us, will give us the benefit of some of his experiences in this branch of orthodontia.

The subject of oral surgery is left so much in the hands of the general surgeon that we dental surgeons see comparatively little of it. This branch of our profession should be brought more prominently forward, and we should devote more attention and study to its advancement and practice.

Every person who holds the degree of "Doctor of Dental Surgery" should thoroughly understand at least the theory of oral surgery. He should pay especial attention to this branch while at college, should attend clinics and practical demonstrations on the diagnosis, treatment, and operation for every lesion of the hard or soft tissue of the oral cavity.

We should keep this subject alive, and inject it into our everyday practice by study of current literature, and especially by clinics, papers, and discussions at our usual society meetings. No association should consider its clinics complete unless it includes some operation in oral surgery. We are too prone to stay in the old rut, and have come to think all we have to expect at a dental association's clinic is to see some fellow cut away half a good tooth and build it up with glittering gold or glaring porcelain. We forget that the hare-lip of the same patient was sewed up by an M.D., that the split palate was spliced by a general surgeon, or the small bony tumor removed by our friend, "the doctor." We are the proper and legitimate "doctors" to perform these operations, and there is no reason why we should take a back seat. Our education and manual training fit us pre-eminently for "oral surgeons," and I hope the time draws near when we shall be looked upon as such. In this connection Dr. Cowardin, of Richmond, promised to read a report of several surgical cases taken from office practice. I hope his example will lead others to relate their experience and express their opinion.

DISCUSSION.

Dr. Jules J. Sarrazin: Dr. Hardy having been delayed in the preparation of his report by sickness in his family, I have not had the opportunity of reading it, and am not, therefore, prepared to open the discussion along scientific lines. In listening to the reading I was struck by the absence of detail. This leaves but little opportunity for discussion. I can, therefore, only give the paper my indorsement on the general lines that it is always safe to follow.

Dr. F. Holland, Atlanta, Ga.: If the dentist of to-day is not to take more interest in surgical operations; if we are simply to continue to work along the same old lines, to travel in the same old rut, then I am not in order. It should be recognized that there is a large field to be developed. I believe that as between the M.D. and the D.D.S. the latter has the better opportunity for observation, and should be the one called upon in cases demanding surgical operation about the oral cavity. And every dentist should be prepared to respond to such calls without fear or hesitation. Of the fifteen or twenty cases of antral trouble treated within the year by surgical procedure (being a medical graduate, I am perhaps more fortunate than some in being called upon to treat such cases), I find that all those I have been able to follow up have had favorable results. I hope to see the day when we will no longer be classed as mechanics. We have only to live up to the proper standard to have our just claims recognized. We claim to be oral surgeons; let us operate as oral surgeons.

Dr. T. M. Allen: We have fallen into an obnoxious habit, in our discussions, of using the terms "doctor" and "dentist" when we mean "physician" and "dentist." We know that in our dental schools the dentist receives more of a medical education than the physician in the medical schools receives of a dental education. The properly educated dentist is the equal of the physician, so far as the field he occupies extends. Dentists are now recognized as the leading specialists in all that pertains to oral surgery.

Dr. H. J. McKellops: I have attended more association meetings, and have traveled more, perhaps, for the purpose of attending those meetings, than any one here present, and I want to say right now that medical schools do not recognize dentists as oral surgeons when they have only the dental degree; and how can it be otherwise when we recognize the fact, which cannot be denied, that dental diplomas and dental degrees are to be purchased by any one and every one who has a few dollars to put up. In some states dental practitioners are taxed annually on the same footing as the butcher and the baker. We must take some action in this matter.

Dr. L. G. Noel: While we are discussing the report on orthodontia we would like to hear from Dr. Younger, who has had perhaps more success than any of us in the treatment of the class of irregularities defined in the paper. It has been said that unless

the retaining bandage is worn a year at least, the teeth will drift back to the old position. We would like to hear from Dr. Younger on this question.

DR. W. J. YOUNGER: I would prefer to demonstrate my methods rather than speak about them. My fingers talk better than my tongue.

With regard to my method of regulating with threads, I will say that they take up less room and work more rapidly than any metallic appliance that has been devised; that they are so easy in action that a child will tolerate them without a murmur; that by this method a tooth can be rotated upon its axis without disturbing the relations of the other teeth.

I also hope to show you what I mean by the artistic treatment of teeth, by process of which the appearance of the individual is improved, the teeth beautified, and their usefulness prolonged.

You will find that the enamel of the teeth in adult life has upon it the erosive impress of the acid saliva in which they have been bathed for years, and of the various acid medicines that have been used, especially in sore throat, diphtheria, etc., from childhood; and that it consequently presents an eroded, disintegrated, and more or less chalky and discolored surface. It is this chalky surface of enamel on the approximal parts that catches the acid mucus and retains food *débris* and bacteria of decay, which, by continually deepening the erosive effect, in time reaches the dentin, and decay is rapidly established. This deteriorated layer should be carefully and completely removed until the dense, clear, pure enamel is revealed. This enamel then, if thoroughly polished, will present a surface that will shed the acid mucus and decaying influences like a duck the water off its back, and will not only preserve the teeth from decay and prolong their existence, but by its brilliancy will add a charm to the face and a beauty to the smile that nothing else can give it.

The object of orthodontia should be not merely to get the teeth into symmetrical position, but to make the teeth themselves symmetrical, and, by removing this disintegrated layer and thoroughly polishing the true surface of enamel, protect the teeth from decay and prolong their usefulness. I propose to give half a day to a presentation of my methods, which will, I think, be new to many of you, though some now present are familiar with them.

Dr. J. G. Fife: I would like to hear from Dr. Younger about his methods in retracting the six anterior teeth. I have heard something of the wonderful results he has obtained, but I would like to know how he obtains such results.

Dr. P. J. Friedrichs: The difficulty in attempting to retract the six anterior teeth is that the posterior teeth, used as anchorage, are liable to be drawn forward, but this will not be the case if the anterior teeth are carried back one at a time. If a bicuspid or a first molar is extracted to make space, one tooth at a time can be drawn back into the space made for it without moving the posterior teeth forward.

Dr. Younger: In regard to retracting the six anterior teeth, I will say that in 1870, I think that was the year, General Ord, then commanding the Department of the Pacific, brought me his little daughter for the purpose of retracting the superior incisor teeth, which were protruding at an angle of about forty-five degrees. The permanent molars were not secure enough to offer sufficient resistance as anchorage. The child, who was under twelve years, had a very thick tress of hair, and, using that as a cushion, I invented an appliance which consisted of two strips of pasteboard about an inch and a half in width, one passing over and the other around the back of the head and united in front of the ears. From this point, on each side of the face, a band of rubber was stretched to grasp the end of a piece of wood about three inches long and a little thicker than a lead pencil. The center of this wood rested on the centrals—the two most projecting teeth—and was notched to receive their cutting-edges. The pressure brought to bear was such that in three weeks the deformity was entirely reduced and the teeth secured in artistic position. It is from this rude but thoroughly effective appliance that the C. C. Knowles, Goddard, and Angle, etc., appliances have sprung. Since then this has been my favorite means of reducing such deformities, especially in young persons.

Dr. H. W. Morgan, Nashville, Tenn.: One important factor that has not been mentioned, but which must be taken into consideration in the regulation of these cases and their subsequent retention in position, is the part played by the anterior lower teeth. Failure to give them due consideration is often the cause of failure to secure permanent good results. I have a case in mind in which

the superior anterior teeth had been brought into position three times, but they went back because interfered with by the lower teeth. If entirely freed from occlusion with the inferior teeth, they will be more likely to stay where they are put. The lower incisors and cuspids will often have to be shortened, drawn back, or forced back into the alveolar process, or they may force the superior teeth forward again. No one should undertake the treatment of such a case until he has taken all these things into consideration. All fixtures should be *fixed*, and the teeth should be carried back as rapidly as possible. Unless the appliance is fixed it will not do the work adequately. It should be so arranged that the pressure will be constant.

Dr. A. R. Melendy: In those cases where the cuspids are so hard to start it has been recommended that the process be cut away in advance of the tooth, so that it will not have so much resistance to overcome. In the first case in which I tried this method the pulp died; the second case was fairly successful, but the third was not sufficiently so to induce me to try it again. I would ask if others have tried this plan,—that of breaking up the process in advance of the tooth to be moved?

Dr. Geo. B. Clement: In dealing with irregularities of the teeth we must take into consideration the character of the structure surrounding the teeth and the method of its formation. The proper thing to do is to start far enough back to *prevent* irregularities. Every child has twenty deciduous teeth. When these have erupted they, as a rule, occupy their normal positions without any irregularities. This process is completed at the age of four years at the latest. These teeth are subsequently shed, usually beginning at about the age of six and one-half or seven years, being preceded by the appearance of the first permanent molars. Our great object now should be to prevent irregularity of the permanent teeth, and the great point is to keep the first permanent molar back in its proper place, and to allow the permanent central incisors to occupy their permanent positions. To do this, take care of the intervening teeth, and keep them in place until nature removes them to make place for their successors. Watch them closely, and fill them if necessary, but do not allow them to be removed till their successors are ready to take their places. If this is successfully done, you will have no irregularities in the

permanent teeth. I have been practicing twenty-three years, and I have always made it a rule to keep the first permanent molars in their proper place, and to preserve the space between the molars and the permanent incisors by caring for intervening teeth. I instruct patients as to what they are to expect in the mouths of their children, especially as to the appearance of the first molars, and have them bring the children to me for examination. It must be remembered that though the bicuspids occupy less space than the deciduous molars which they replace, yet that the permanent laterals and cuspids require more space than did their predecessors, and that if space is not jealously guarded for them then there will be crowding and protrusion or other irregularities. I advocate the prevention of the crowding of children's permanent teeth, and this can be accomplished by proper care at the right time. Of course, I am not speaking now of those cases in which heredity is a factor, though even that can be overcome.

Dr. H. H. Johnson: I would like to ask those gentlemen who have had great experience in these matters how long it is necessary that a retaining apparatus be worn to overcome that tendency to return to the original position. Of course there are cases where the opposing teeth hold them in their new position, but I refer to those other cases, in which there is nothing in the occlusion to retain them. How long must the retainer be worn?

As to cutting away the process, I have felt afraid of that operation. When the peridental membrane is destroyed—and I imagine it would be difficult to cut away the process without risking some accident—a slip of the instrument might destroy the usefulness of the tooth.

Dr. Younger: You may put this down as a rule, that the harder the teeth are to move the more difficult they are to retain. If they move easily, a few weeks will sometimes be enough for the retention appliance. In other cases it may have to be worn a year or more. I had a case, a gentleman thirty years of age, whose left superior central was playing leap-frog with his right. After I had gotten it in position he wore a retainer three months. The first day after its removal the tooth started back. This tooth bothered me for nearly a year, but reflecting one day that the cause of this tooth's contumacy was due to the stretched tissue of attachment that would not loose its tonicity, I resolved to detach

this central from the bulk of this dragging tissue, theorizing that it would then contract to its normal length, and, reattaching itself at the new point of contact, would itself hold the tooth in the position I should place it. So with a delicate bistoury pointed blade I severed the lateral attachments, being careful not to wound the cementum, pushing the blade in these parts as far as I could force it, then carrying the blade around the whole palatine surface, but not disturbing the central labial aspect, in order to prevent the possibility of the gum retracting in front and exposing the root. When I had finished I found my tooth quite limp and helpless, so, tying it in position, I waited for a couple of weeks. I found then that the tissues had reattached themselves at the new point of contact, and subsequently proved they were holding the tooth firmly in the new position, for it has never since then attempted to budge from its new location.

Dr. L. M. Cowardin: As to a retaining apparatus for the six anterior teeth, there can be no rule as to how long it should be worn. You can only try removing it, and if the teeth start to go back put it on again and wait longer. It is very rarely safe to remove it in less than twelve months. Very often there exists a vicious habit of holding the tongue against or between the upper and lower teeth, which, if not discovered and overcome, may baffle our efforts.

Dr. Wm. Ernest Walker: In a case which I corrected in the summer of 1888, and which, as it was between my college terms, I had to carry on as rapidly as possible, I moved back both the upper and lower anterior teeth in six months. I was, of course, obliged to carry back all the anterior teeth at once, as moving them one at a time could not have been accomplished within that limited time. I do not, however, approve of such rapid work under other circumstances. It was a case amounting to deformity, with marked impairment of speech, and one in which heredity had to be overcome, both the mother and grandmother of the patient having the same prognathic development. Back of that there was no history. The patient was probably twenty years old when she presented for treatment. Fortunately the patient had a very heavy suit of hair, and I used it as a pad for the neck, under a board which served as anchorage for moving back *en bloc* the entire anterior lower arch. I should have said that I first removed

a bicuspid from each of the four quarters of the mouth. The retaining bandage was of the removable variety, and was advised to be worn for six months, but four times as long was eventually found to be necessary before the teeth would remain permanently in place. I may say that each arch was well developed in itself, and the teeth, which were unusually fine, were regular in the two arches, and the posterior occlusion was perfect, but the anterior portions were not in harmony with the face, the lips failing to cover the teeth except by special effort on the part of the patient. The results have been eminently satisfactory, as the patient is now a successful school-teacher, with noted ability as an elocutionist. Before the correction of the prognathic development, ordinary conversation required a painful effort, so much so that she avoided society. I now use the Jackson bandage with great satisfaction. By this system the teeth are moved gently and without inflammation. Patients prefer this method, as they can keep the teeth and bandage clean and lay it aside on special occasions. In the use of more forceful appliances, if they are temporarily removed, the teeth go back and the forming tissue is broken down and destroyed; but with the Jackson bandage the movement is so gradual that what is gained is retained. In cases of marked heredity, however, they may be moved, the teeth will tend to go back, and a retaining apparatus must be worn a long time.

Two or three summers ago I had a case in which I drew back the six upper anterior teeth. When the retaining bandage was removed I found that one of the laterals would go back, seeming to be pushed laterally, not forward. I examined carefully, to see if it were due to the occlusion, but there was no burnished place on a filling in the tooth such as would have been the case had the change been due to the impact of an opposing tooth in occlusion; nor could I, for over a year, get the patient, in my presence, to put her teeth in such a position as would cause the movement. I was on the verge of concluding that it was one of those rare cases of voluntary tooth-movement, a few of which have been reported. Finally, however, I succeeded in getting the jaw in the position in which biting caused a lower tooth to strike the lateral incisor and drive it laterally. I dressed down the offending tooth, and have not seen the case since.

A Simplified Fracture Splint.

By JULES J. SARRAZIN, D.D.S., New Orleans, La.

SOME months ago a dentist of New Orleans called on me for consultation in a case of fracture of the lower maxilla. The case presented nothing abnormal, except that the patient was unruly and could not be induced to wear any form of bandage that would to any extent interfere with mastication or speech, or cause temporary disfigurement. Here in New Orleans we do occasionally encounter such patients, although they fortunately are exceptions; and, of course, we cannot always make successes of them. I fear that we did not at the time completely solve the problem, but it was nevertheless food for thought. I have never heard the outcome, and it is therefore easy to surmise.

The matter has since frequently recurred to my mind, and I have wondered whether, after all, patients were not somewhat justifiable. A review of fracture bandages discloses an array of splints which are all more or less uncomfortable and disfiguring while worn. In cases where there are teeth enough for attachment a bandage can be made which will allow perfect mastication, cause hardly any impediment to speech, and be apparent but very little indeed.

A couple of strongly rooted teeth on each section of fracture, or possibly one only, if it be a well-developed molar, will suffice for secure attachment.

The simplicity of the following will commend itself. We are dealing with a fracture of the lower maxilla, the most commonly occurring:

The first step is the making of a good model of the upper teeth. Next is needed an accurate model of the lower teeth. Little effort need be made to have the fracture in perfect position while the

impression is taken, because breaking the lower cast at the place where the fracture exists in the natural jaw under treatment, and setting the pieces of the model to occlude with the upper teeth, just like close examination of the patient's teeth will suggest, will prove most satisfactory both in practice and in result. The case having been mounted on an articulator according to the above process, a simple lower splint is to be made, occluding perfectly with all the upper teeth, and extending one-eighth to three-sixteenths of an inch lower on the gums than the exposed necks of the teeth. This last detail has an importance which will become apparent later on.

The splint should not be very thick, and should include the last posterior molars present. After polishing, it should be sawed through in such a way that, without weakening it greatly, it would require only little cutting with an engine bur to join the ends of the lines sawed through the rubber. The edges resting on the gums should be well rounded off, and of sufficient thickness not to wound.

Small drawn places between the teeth inside of the splint should be trimmed so that the natural teeth may readily slip in place therein.

While all this is being done the patient should be well fed, because nothing but liquids through a curved tube will be available for the next eight or ten hours.

A little yellow wax melted and dripped into the lines sawed through the splint complete the work preparatory to insertion. Now try in the mouth, and make sure that with the jaws closed and pressed together all parts will go in place nicely, and that the occlusion of the upper teeth and splint will be perfect.

Measure a sufficient length of linen or cotton duck, or some other material which will not stretch. Cut it from two and a half to three and one-half inches wide, as the case may require, and long enough to wrap eight or ten times around the head and closed jaw, cheeks, and ears of the patient.

So far we have proceeded leisurely, but now comes the critical moment, when quick and accurate handling will be needed.

The splint has been removed from the mouth, washed, and well dried. The bandage cloth is waiting in an accessible place; its seams strongly sewed, its whole length easily unrolled, and a few reliable safety pins with it.

On the mixing slab oxyphosphate powder and liquid are ready. Now stop and make sure that nothing will be wanting, that everything is reliably arranged. Then direct an assistant to hold the end of the cloth bandage, passing loosely under the jaw from behind the patient's head.

Have absorbents at hand to dry the lower teeth with. Now rapidly mix cement to a medium thick consistence, fill the inside of the splint with it, dry the lower jaw and teeth, and insert the splint while your assistant relinquishes hold on the cloth bandage, which you wrap strongly around the head, jaw, cheeks, and ears, after quickly bringing the splint and inclosed teeth to duly occlude with the upper jaw. Fasten the bandage securely with the safety pins, and dismiss the patient for a little longer time than the cement will require to harden.

If you are kind-hearted, make a present of a curved glass tube to feed and drink through meanwhile by inserting between the cheeks and teeth.

The patient may have been swallowing saliva while cement was mixed. A little moisture would not cause failure, but the nearest possible approach to dryness is desirable. The edges of the splint a little lower than the exposed necks of the teeth will have forced the cement well between the approximal surfaces of the teeth, making a secure fastening to the well-dried splint.

At the next sitting the cloth bandage may be removed, the excess of cement trimmed off, and the patient allowed to masticate henceforward on the rubber occlusal surface. Appearances will not be ungainly nor speech difficult.

When the case has healed the engine will easily join the ends of the lines sawed through the splint, which will then be peeled off in sections. The cement, which will not readily break off and force out from between teeth, may be treated with strong alkaline baths until it dissolves away. And this concludes the description of a fracture bandage, both simpler and more comfortable than those ordinarily in use.

DISCUSSION.

Dr. P. J. Friedrichs: I have been appointed to open the discussion of this paper, but I have had little experience in the treatment of fractures of the maxillæ. In twenty-five per cent. of the cases, however, I believe a very simple appliance, like this rubber splint,

will be all that is required. Since I have seen this splint I have not had a case in which it might be used. The idea of using oxyphosphate cement as a fixative appears to me to be quite new. The only objection I see to the splint, theoretically, would be the difficulty of removing it; it has to be removed in sections and destroyed in the removal, while in case of severe inflammation it is sometimes necessary to remove the splint and replace it again. This splint would undoubtedly keep the parts in perfect apposition, and allow nature to do her work. The essayist says that he would feed the patient by means of a bent tube; but with a bandage put on as he has described, with nothing exposed except the nose and eyes, and especially unless the patient has lost some teeth, I cannot see how even a bent tube could be made available. It is true, however, that he provides for the removal of the bandage after the cement has set, when the excess of cement is to be trimmed off, and the patient allowed to masticate on the rubber occlusal surface. Theoretically, I indorse the splint, and hope he will soon have an opportunity to test its practicability.

Dr. Wm. Ernest Walker: I have been trying to induce Dr. Sarrazin to exhibit the splint which he brought here for that purpose, but it appears that he carried it in his overcoat tail-pocket, and as he sat down upon it and broke it in three pieces he objects to showing it. Although so constructed as to resist the strain of the masseter muscles, in sitting down upon it it was in such a position that it broke along the lines which had been sawed partially through, to show the method of removal.

Dr. A. E. Blake, San Francisco, Cal.: I have treated over one hundred and fifty cases of fractured jaws, and I do not consider this splint practicable, or that it would do to secure it in place with cement. The author would find that when the splint was removed there would be a space of half an inch between the jaws; there would be no occlusion. One speaker said that it was sometimes necessary to remove a splint in case of severe inflammation, but that is not so; the splint is always kept in position. The author can have no idea of the trouble there would be in the removal of a splint cemented to the teeth. A practicable splint would be one similar to that described in the paper, but having the occlusal surface filed off, so that the teeth would protrude and articulate. There is always more or less shrinkage and absorption of tissue under a

splint, but if held in place with platinum wires they can be tightened from day to day.

Dr. Sarrazin: I thought this splint might be new perhaps in some of its features, and presented it in order to learn whether it would appear practicable. As regards occlusion, mentioned by the last speaker, I have amply provided for that, as my models will show. I will not occupy your time further. I thank you for the kind reception given my paper.

The Too Frequent Sacrifice of Teeth, in the Treatment of Diseases of the Antrum.

By L. M. COWARDIN, M.D., D.D.S., Richmond, Va.

IT is well known that the forms of disease most frequently affecting the antrum are mucous engorgements, both simple and purulent. The suppurative is usually caused by alveolar abscess.

In consulting authorities, four of which I now have before me,—Garretson, the "American System of Dentistry," Bryant, and Marshall,—I find that in the treatment of these diseases of the antrum they all recommend the extraction of the teeth. Where a tooth has given rise to the trouble they recommend its extraction, or where no tooth is the cause they advise the extraction of the second molar, upon the ground that its roots approach the antrum at the most dependent point, and will afford the best drainage.

Having had considerable experience in the treatment of these forms of antral diseases, I came to the conclusion several years ago that it was an error to sacrifice teeth in order to effect a cure, and determined to treat the first case that came to me without extracting the tooth.

About two years ago Miss H. called on me for treatment. She complained of pain in the region of the first molar, but the symptoms indicated both pulpitis and apical pericementitis. The first molar had had the pulp devitalized, and had been filled with a large amalgam filling, and was the tooth which gave symptoms of pericemental trouble. The pulp in the second bicuspid was found to be exposed. The pain was promptly relieved by an application of carbolic acid. The patient was made so comfortable that I felt

sure that the cause of her trouble existed solely in the bicuspid, so discharged her, to return the second day following for an application of pulp paste.

In the mean time the pain in the cheek became more diffused and less acute. The molar gave no greater signs of inflammation about its roots. I applied the paste in the bicuspid, but it caused such great pain that I was compelled to remove it before she left the office, and applied the carbolic acid, which again speedily relieved her. On this day, owing to the diffused soreness in the cheek, I had some suspicion of antral trouble, and decided to await developments.

The relief being so great from the last application of carbolic acid to the cuspid, I again discharged her for a rest of two days. On the morning of the second day her eye (conjunctiva) became congested, and there was so much soreness in the orbit that she determined to see an oculist.

By this time the disease had so far developed that antral trouble was easily detected. The eye specialist sent her back to me with the request that I would extract the tooth. This I declined to do, and told the patient that I could cure the trouble without the loss of the tooth. To this she readily assented, and I turned her over to my assistant, with instructions to treat the tooth as in the case of an ordinary alveolar abscess. This he proceeded to do, also treating the bicuspid. He accomplished this treatment in four days. For the relief of the antrum I made an opening through the canine fossa, and treated the antrum daily by syringing it with peroxid of hydrogen, followed by salt water (normal).

On the third day I found no sign of pus, and discharged the patient for two days. When I again saw her there was still no pus, so I dismissed the case. Since that time the patient has several times returned to my office for other work, but there has been no return of trouble in these teeth or the antrum.

I regret that cases of antrum trouble do not present themselves more frequently in my practice, thus enabling me to substantiate the treatment herein set forth.

I related this case to one of my graduates, and he has just given me the history of a case which by my advice he has treated in a similar manner with a like result, and which, with your permission, I will read.

TREATMENT OF THE ANTRUM THROUGH THE CANINE FOSSA.

In August, 1897, I was called upon by a lady to do some general filling. Among the work was an upper right second bicuspid with a chronic abscess, which the patient said would swell and discharge from time to time.

Upon inquiry I got the following history: She was thirty-six years of age; had suffered with atrophic rhinitis for about twenty years; the abscess was of several years' standing; upon blowing the nose she would at times notice the presence of pus, which came from the nostril of that side, and there was more or less dull pain about the region of the antrum.

She had been for several years under the care of a specialist who treated her for the catarrh, telling her he could not effect a cure, but could hold it in check by palliative measures. She had not been to him now for about six months.

From the history and symptoms I saw that she had antrum trouble, but I was not satisfied that the tooth was the cause. I told her my diagnosis, but she was inclined to doubt it, as a dentist had on a previous occasion told her the same in reference to the other side, and it had proven not to be the case. Along with the other work, I treated this bicuspid, and with some difficulty succeeded in curing the abscess and permanently filled the tooth.

I heard no more of the case for three or four months, when one day she returned, saying her physician said there was pus in the antrum, and that this tooth must be extracted in order to evacuate the pus and treat the part.

Upon examination and inquiry I found that the tooth was doing good service; the fistula healed, and the tooth giving no trouble in any way. She still complained of a pain in the face and soreness in the first bicuspid and cuspid when tapped with an instrument.

I explained to her that it was unnecessary to extract that or any other tooth, as an entrance could be effected through the canine fossa. She preferred this or any other method whereby the tooth could be saved. She reported this to her physician, who agreed to have it treated by this method.

I opened the antrum in this manner, and pus followed the withdrawal of the drill. I syringed it first with warm salt water, and then with hydrogen dioxid. I found that the hydrogen was giving

considerable pain, the membrane being in a very irritable condition, so I discontinued its use for a while, using only carbolized water to soothe and tone up the membrane. Then again used hydrogen dioxid greatly diluted and gradually getting it up to full strength, always using afterward a saturated solution of boric acid.

The cure was delayed on account of complication with ethmoid disease, pus discharging from these cells and keeping up the infection. The presence of pus became less and less evident, until in about seven weeks the solutions would come through the nostrils perfectly clear and free from pus.

I have seen the patient within the past week, being now more than a year since treatment, and she reports no further trouble either from the antrum or the tooth.

As ethmoid disease is not an uncommon accompaniment of atrophic catarrh, it may be that this was the primary trouble, and that the antrum was infected from it rather than from the tooth.

However, the point I desire to illustrate is that of treatment of the antrum through the canine fossa, rather than by sacrificing the tooth. Wm. D. Willis, M.D., D.D.S.

DISCUSSION.

Dr. J. P. Corley: I did not know before that I was expected to open the discussion of this paper, and as I have not had an opportunity of reading the paper I hope I may be pardoned if my remarks are lacking in scientific arrangement or accuracy.

I am sorry to say that, as dentists, I think we do not go into surgery as we should do. Dentistry was formerly a mere handicraft, its followers classed with watchmakers and barbers. The oral surgeon of the twentieth century must be a therapeutist, a physician, a physiologist; he must be as familiar with all the organs of the physical human being as the practitioner of any other specialty. The time is at hand when he will be accorded all the prestige he is heir to; he has only to go forward and take what is his.

I am not prepared to enter into the scientific discussion of this subject, but if I may be permitted I will cite some cases from my practice. I see no reason why it should be necessary to sacrifice the teeth in the treatment of the antrum. Nine out of every ten cases of empyema of the antrum are due to the presence of devital-

ized teeth in close proximity to the antrum. The opening through a root-canal is often sufficiently large for treatment and drainage of the antrum. In a recent case, in which the second molar was involved, I opened, cleaned, and filled the buccal root. I then opened the palatine root and placed in the canal a platinum cylinder, which I cemented in with oxyphosphate, filling the pulp-cavity around the cylinder with amalgam. Inserting the nozzle of my syringe into the tube I was able to inject tepid salt water, dilute listerin, carbolized water, etc. The patient continued the treatment at home, and in two weeks it was well; and there has been no return of the trouble. An objection to treating through an opening in the canine fossa is the flap of soft gum-tissue, which is in the way; and then you do not get an opening into the base of the cavity, but nearly always into the side; and then, too, it is necessary to insert a drainage tube or the opening will close up. Unless the nozzle of your syringe goes in through the alveolar process, you cannot force the contents out through the small opening into the posterior nares. By injecting through the tooth you can use more force. Trouble is sometimes due to a closure of the little duct opening into the posterior nares, causing an accumulation of degenerated secretions. If a tooth is removed there will be more or less shrinkage and absorption, and it may be necessary to wear a plate to keep food from entering and to preserve the opening. The *rationale* of treatment through a tooth is good. I would prefer rather to devitalize a sound tooth if necessary and treat through the canal than to remove a bad tooth and treat through the socket. I am aware that *reporting cases* is considered empirical, but I had to use the material at hand in discussing this paper without preparation.

Dr. L. A. Smith: In a recent case——

Dr. Cowardin: Papers should be discussed upon their merits, and reports of cases upon their individual merits.

Dr. Smith: The case bears directly upon the paper. I did not suspect antral trouble until my probe passed through the foramen into the antrum. I treated through the canal and cured the case, subsequently filling the canal and placing a porcelain crown on the root. There has been no further trouble.

Dr. T. C. West: I would like to ask Dr. Cowardin where he prefers to open into the antrum? I had a case in which the patient

was kicked by a horse, breaking through into the antrum between the cuspid and the first bicuspid. I removed considerable necrosed bone, and inserted a silver tube with a flange to cover the opening and avoid the trouble with the flap of soft tissue mentioned. Before coming to me the patient had been under treatment for a long time without receiving any benefit. I washed the cavity out with salt water, and began at once to treat with iodoform vapor, using Blair's vaporizer, till the vapor came out through the nostril. I had one case which a physician brought to me, to insert a tube for a patient who had no teeth. He broke the end of the tube off, and the rest of it is still in the cavity; at least I have never been able to find it. What would you do about it, and where did it go to?

Dr. Frank Holland: Does Dr. Cowardin wish to be understood to say that he can get an opening through a root-canal sufficiently large to treat extensive cases of diseased antrum?

Dr. Cowardin: My paper was designed only to show a method of treatment by which a tooth might be saved instead of removed.

Dr. B. Holly Smith: I feel that I should apologize to Dr. Cowardin in taking part in the discussion of his paper, as I was not present during its reading; but I must take exception to the stand taken here in regard to reporting cases; it is straining after scientific posing. In the medical associations "reports of cases" are considered as very valuable. Our operations are too conservative. Certain cases of diseased antrum require very extensive removal of the floor, so that the cavity can be freely explored with the finger, and so that the interior may be thoroughly curetted. Cases that have been treated for months and years on the conservative plan will yield readily to a radical operation. Oral surgeons always make radical operations for antral troubles of long standing where throat and other specialists decline to operate at all for acute inflammation associated with rhinitis. They often clear up and yield to general treatment. I am inclined to think entering and draining the antrum through the root of a tooth inexpedient and unwise. The treatment would require longer time and more concentrated medicines than by other methods.

Dr. L. G. Noel: With regard to the conservative treatment advocated by the essayist, I would say that when these cases have run along several years they are often complicated with nasal catarrh, the entire mucous surface being involved in the trouble. When it

is a question between saving a tooth and being embarrassed by the presence of the tooth, it is better to sacrifice even a good tooth, if that will give assurance of satisfactory results. I indorse what Dr. B. Holly Smith has said; we need a large opening, sufficient to pass in a little finger. We often find the antrum composed of several small cavities divided by septa. By having an opening sufficiently large the septa can be removed, and the entire cavity opened to treatment. I believe the opening should always be at the bottom. With all deference to the brother from Baltimore, I think it better to open through the buccal alveoli. In one case I removed two teeth—the first and second molars—in order to get direct access. As for treatment, I prefer to use Lugol's solution of iodin. It is very miscible in water, and eight or ten drops in a quart of water, used with a small piston syringe, gives very beneficial results. Some years ago I read a paper before a medical society on this subject. A physician present said his own antrum was under treatment, and that he could not stand such strong solutions; that it would be too painful.

When the roots of the molars penetrate the antrum they may be covered only by a membrane, which, in case of alveolar abscess, is raised up by the forming pus, and there will be no opening to the nares. The products of the abscess may so distend the membrane that the entire antral cavity may be filled, but with no point of exit, thus rendering diagnosis difficult. A mild solution of boracic acid is often very beneficial. I do not believe in drainage tubes, and never use them. With a large opening in the molar region a plate must be used to prevent the entrance of food into the cavity, but it will drain itself. Often in the extraction of teeth roots are pushed through into the antrum. On one occasion, in washing out a diseased antrum, I washed out a portion of root, which had been forced into the antrum by some previous operator.

Dr. L. M. Cowardin: I feel very much gratified that so many have entered into the discussion of this subject. The gentleman who opened the discussion very properly stated that he had not seen the paper, and did not know that he was expected to open the discussion, and was therefore quite unprepared. It is very evident that to open roots indiscriminately for the purpose of treating the antrum through a root-canal is not feasible, and was not suggested in the paper. The method is not offered as one adapted to the

treatment of diseased antrum in general; it is offered as a desirable method in the treatment of purulent empyema, from whatever cause. Dr. Corley's objection to treating per the canine fossa, because it is possible the opening from the antrum into the middle meatus may not be patulous, is not well taken. The method is of course contraindicated when a free opening does not exist, but when the natural opening is not free the opening in the canine fossa should be made large enough to allow free discharge when injections are made. We should not dare to use force, as this is apt to extend the disease to the frontal sinus and the sphenoidal sinuses. There is no necessity for drainage; with the aid of peroxid of hydrogen we can get rid of every iota of pus. Sending peroxid of hydrogen through the wound in the canine fossa, elevating the stream as it is injected, it will pass over the septa and froth out the decomposed secretions from the pockets that may exist. Normal salt solution may then be used to flush the antrum, and any that may not pass out at the natural opening will be freely absorbed by the tissues of the cavity; salt water alone will not wash out the pus. My experience with this method has been such as to prove its efficacy.

I am glad to hear Dr. Noel say he does not believe in tubes. I recall one case that had been treated for two years by a specialist. The patient was sent to me for removal of the second bicuspid, which caused the trouble. I removed the tooth, and the case was treated as just stated for two years, at which time the patient came to me and *with a very big D*—— said he would not return to the specialist. I replied, "If such is your decision I will take the case." I removed the tube, washed out the cavity once only with the salt solution, and he has never had any trouble since. The truth is, he was cured when he came to me, and had been for a long time.

Another case which had been treated in vain for more than a year came to my assistant. As it did not yield readily to the treatment with peroxid of hydrogen and salt water, I concluded that it was either a case of some disease not benign or of some foreign substance in the cavity. I accordingly advised him to examine the antrum for foreign bodies, and found the root of a tooth and a broken canula. This is not infrequently the hiding place of a "mysteriously disappeared" root. The case was soon dismissed cured.

DR. NOEL: Does not peroxid cause severe pain when injected into the cavity?

DR. COWARDIN: If three per cent. solution is carefully used, and the patient properly instructed, there will be no great pain or trouble.

The patient should be instructed to hold up the palate, and not let the peroxid go into the fauces; this will prevent gagging. I have put campho-phenique through the antrum and nose with no complaint of pain on the part of the patient or causing irritation. I have opened through the canine fossa and cured many cases in less than two weeks. It is essential to maintain the opening patulous with a tampon saturated with weak carbolic acid.

Oral Surgery. A Case in Practice.

By Prof. R. C. YOUNG, D.D.S., Anniston, Ala.

Mr. President and Gentlemen: With your permission I beg leave to report a case in practice, which I think will be of interest.

Last June a year ago I was called from my office to a neighboring drug store in great haste. Some one had been hurt, and I was wanted, so the message came. Taking my pocket case and excusing myself from a patient with whom I was engaged, I went. Immediately upon my arrival, in the rear part of a drug store, where all receivers of accidents, it seems, are brought, I found sitting upright in a common, split-bottom chair the most ghastly object it has ever been my fortune to see. A man some twenty-three years old wrapped in a sheet saturated with blood, and holding in his hand a dangling, unshapely mass of bone and teeth, the whole side of the face torn out. Two physicians and a gaping, horror-stricken lot of drug-store help were standing by. The poor unfortunate was perfectly conscious. As soon as he saw me he said, "Doctor, I am so sick" (nausea). The enunciation, you may imagine, was not as clear or distinct as Gabriel's trumpet. I turned to the physicians and said, "Gentlemen, why don't you lay the man down?" "We have sent for a cot." Here I caught the chair by the back and tilted it, so as to recline the patient. Calling a couple of the by-standers, I had them lay him upon the floor until I could improvise an operation table. Gentlemen, think of keeping a person who had just received a desperate hurt sitting in an upright position! The patient complained of being cold, though the mercury stood somewhere near the nineties. I had him covered up, and began an examination.

The man was an operator in one of the local cotton mills, perhaps two miles out. To adjust a belt he had climbed up a ladder, one end of which rested on a revolving shaft, the other upon a slippery floor. The ladder fell, throwing him upon a machine. He must have had his mouth open, as the following will show. The right cheek was cut open from the inner canthus to the commissure of the lip, from a point about over the glenoid cavity, joining cut about on a line with the alæ nasi, a deep cut straight across upper lip just under the nose. A number of minor punctures and lacerations presented further complications. Upon the chin were six or eight cuts and punctures. The nose had a multiple fracture and was driven over to the left. The whole of the upper right maxillary bone had been cut and torn completely from the face; was dangling over the chin, held by a small connection of gum-tissue just over the lateral and cuspid not wider than a lady's thumb nail. An idea will be conveyed if one will think of a pedunculated flap cut for skin-grafting. The bone had to be held to keep it from swinging about at each movement of the head. The cleft had been severed just at the median line between the centrals, along the line of articulation with opposite maxilla; thence along naso-maxillary articulation to floor of orbit; thence across to malo-maxillary articulation; thence to spheno-maxillary foramen, across hard palate from incisive foramen to articulation of palate bone with pterygoid process of sphenoid.

Raising flaps of wound in the cheek, the optic nerve could be seen and touched just as it enters into the sclerotic tunic; passing the finger down the pharynx the pterygoid process could be felt, rough and jagged where articulation had been torn loose. The floor of the orbit was in plain view, and I thought, as I held the bone in my hand, what an opportunity to study a fresh antrum. But now was a time for action and not study. Nothing had been done for the patient but a hypodermic of morphia and strychnin, a most excellent means of preventing or controlling shock. He had been driven in an open buggy at least two miles. The hemorrhage, as you can imagine, must have been very profuse. One man said he had painted the whole mill red (rather a ghastly jest). Here is a point worth note: The wound had been made with a blunt instrument, was more of a laceration and wrenching apart, dragging the vessels out to their utmost, tearing them in two, so

when they broke they contracted much as though torsion had been used. This, I believe, must have saved the man's life, as otherwise he would have bled to death before assistance could have been had. The hemorrhage was still considerable when I reached him. There was a porcelain vessel of hot water at hand; with an ordinary household syringe (new), I douched the parts with hot alum water. This brought the hemorrhage well under control. The arteries had so contracted that they could not be taken up. There was still a slight hemorrhage, which did not entirely stop until next day.

I was entreated by the superintendent of the mill to save the bone, which contained all the teeth on the right side from the central to the third molar, including tuberosity. One of the physicians, as soon as he saw the case, said, "This here thing must come off," but it didn't. After thorough examination on general principles, with hands and instruments well sterilized, I removed spiculæ of bone, and, after pointing out optic nerve, pterygoid process, and some other points of interest, went to work.

Now came the "tug of war." I could get but little assistance. When I placed the bone in position the anterior or cheek part would be well aligned, but the palate or distal part would not fit, and *vice versa*. After several futile attempts, I decided the facial aspect was more important, so got it nicely adjusted, which I assure you was not unlike putting together a Chinese puzzle. Now, how was the part to be held in place? A splint was out of the question. There was nothing in view to suture to, no place where attachment could be had by drilling. My only hope was a ligature caught in the gum over first molar, carried through cheek, and tied outside just under the eye. Two ligatures were used here, and held the bone well up. Then, with a modification of Brophy's operation for cleft palate, I passed a wire suture through the edges of the wound on hard palate; thence between the teeth on the opposite side, twisting the ends of the wire together. Three wires were used, which held the bone laterally. A wire was passed from cuspid to cuspid. Thus I had the bone held in three ways. I found the lower incisors knocked out and broken off. Process driven back so teeth pointed down the throat. This was easily replaced and held by wire. Bone in place, the nose was now given attention. I found the bone fractured in several places, nose much displaced to the left. After reducing fracture, I inserted into the

nostrils two rubber tubes the size of my little finger. The rubber was quite thick, ribbed, not smooth. The ribs gave drainage, the tubes held the parts well and allowed the patient to breathe through the nose. Forty-odd stitches were taken in the soft tissue, silk being used. Some of the ligatures were very fine, the common size being split to get them small enough. About the thirty-fifth stitch I found my fingers so paralyzed from the carbolic solution in which ligatures and instruments were saturated that I could not push the needle through the skin on chin, and had to get one of the physicians to assist in the last few stitches. In the corner of the lip was a piece of tissue about the size of the rubber eraser on an ordinary lead pencil, hanging by a meat thread, so to speak. It was almost black, but, if lost, would make an ugly deformity. It was thought best to remove it, but I was anxious to give it a chance. With a very fine needle and delicate silk thread two stitches were taken, and I was gratified with the result after recovery. I trimmed it down, and was rewarded with a perfect mouth. The external wounds were dusted over with aristol. A linen cloth, on which had been put some simple cerate, was placed on, and over this absorbent cotton. The whole was done up with a Gibson bandage, the patient turned over to a physician, with instructions to syringe mouth three times a day with a ten per cent. solution of boric acid, using the household syringe. I saw patient next day, face fearfully swollen and much discolored. There was but little fever; had rested fairly well during the night; gave saline cathartic and quinin. Third day dressing was removed; found some pus. Wounds inside and out cleansed with a three per cent. pyrozone; head and face still very much swollen, but color improving. Patient restless and nervous, had great trouble to keep him quiet.

All the mill hands wanted to come to see him at once. Strict attention was given diet and hygienic surroundings. After the fifth day he began to improve rapidly, and continued to do so. The second week he was able to be set up, and gained strength daily. He was still under close surveillance. The physicians rendered valuable assistance, carrying out the treatment to the letter. After the third week he was able to come to my office for treatment, which I had him do twice a week. The dressing of the parts was still kept up twice a day by his wife, who was now quite handy at it. As a tonic he was given phospho-muriate of quinin

compound, Phillips'. The man made a perfect recovery; the external wounds left a wonderfully small amount of eschar; the nose was perfect; he used his teeth as though they had never been out of his head. The third molar and its surrounding alveolar process, with tuberosity, were exfoliated. All the other teeth in the upper jaw are sound and seem to be alive. There is a small opening in the hard palate, where, through loss of tissue, union failed, but gives no inconvenience, and will, I think, almost fill up in time. I reduced it very much by paring the edges of the break and stimulating granulation.

I saw the man last about six months ago. Nearly eighteen months had elapsed since the accident, and he said he was as sound as before he was hurt.

I report this case simply to show the wonderful recuperative power of the facial regions in accidents affecting these parts. An effort to save every part should be made. The ingenuity of manipulation, the familiarity with the minute anatomy of the parts, the realization of strict attention to asepticism makes the dental surgeon peculiarly fitted to attend to this class of accidents.

Dr. Wm. Ernest Walker: I saw this very remarkable case a few months after the operation. The face was scarred somewhat, but not very badly. There was still a small opening in the hard palate, which had not quite filled in.

A Case in Practice.

By Dr. C. B. JOHNSTON, Monroe, La.

Mr. President and Gentlemen: In presenting this case in practice I feel assured that I am telling you something new, but doubt very much that you will be profited, for I do not suppose there will ever be a parallel case. This article, not written by myself, but by a personal friend of the patient, Captain Myatt, and also of myself, shows what is possible to be done with the dental engine in the hands of a dentist. I will now read the case, and give my treatment afterward.

A REMARKABLE CASE.

A dentist of Monroe, La., brings to light the hidden mysteries and freaks of the leaden missiles of the late Civil War, and performs a delicate surgical operation, one highly creditable to surgery and his profession.

Captain Alex Myatt, a now well-to-do merchant and planter of Ouachita Parish, during the late Civil War was a member of Company K, 31st Louisiana Volunteers, and did service at the battle of Chickasaw Bayou, Port Gibson, and Vicksburg, and during the siege at the latter place on the 10th day of June, 1863, was wounded, supposed to be fatally, being shot in the right eye with what is now supposed to be a Springfield rifle ball of about fifty-five caliber.

This ugly missile, while not taking a proper course or direction to produce death, has for more than a third of a century been a source of torture and punishment to the victim of its range. In fact, I have sometimes thought that of all Confederate soldiers, except those who lost their lives, this old veteran had been more punished for his love and fealty to a now lost cause than any other

one of the grand and noble army that fought under the stars and bars for the preservation of State rights.

When wounded the best surgeon of the Confederate army considered the wound of Captain Myatt fatal. He remained in the hospital until the fall of Vicksburg, which occurred on the 4th day of July following. After the surrender of the Confederate forces to the Federal army, General Grant, who was in command of the latter forces, while visiting the Confederate hospitals, had his attention called to the nature of this wound, and at once became so interested in the case that he ordered his staff surgeon to visit the patient and examine the wound of Captain Myatt. This physician and surgeon of national fame, after making a careful examination, agreed fully in the diagnosis made by other surgeons,—namely, that the bullet, after penetrating the eye, had taken a due backward course, lodging in the back part of the head, which would make its location and removal impossible without immediate danger to the life of the patient. On the 17th of July, something more than a month after receiving this wound, Captain Myatt, with the other wounded soldiers, was paroled and sent home.

His wound was of such a nature as to prevent his return to the service at any time during the remaining period of hostilities, at the close of which Captain Myatt found himself not only a financial but also a physical wreck. Notwithstanding this, however, he entered the battle of life with the same courage and determination that had marked his course in the service of his country, making, as he has, ample provision for a growing family and gradually accumulating a competency for the declining years of a well-spent life. Not only doing this, but always taking an active interest in all matters of public concern, contributing his time, talent, energy, and means to the upbuilding of schools, churches, and good government. He, with Captain H. W. McLeod, from 1872 to 1876, went into each and every Democratic convention held in the Parish, and there fought for the adoption of a policy that was finally incorporated in the platform of 1876 that resulted eventually in the overthrow of carpet-bag rule from the Arkansas line to the Gulf. No less than ten White League companies were organized in Ouachita Parish. Of the ten leaders Captain Myatt, owing to his wound, was considered the most delicate, but, strange to say, carrying, as he has, this ugly missile of war for the past thirty-five years in his

head, he has, up to date, witnessed the death of no less than seven of the ten.

In all these years of torture this man has visited and consulted, at various times, some of the most eminent physicians and surgeons of the South, all of whom declared their inability to give permanent relief or advise any course that would eventually lead to a solution of a removal of this bullet. As early as 1867, with his family physician, Dr. Cheatham, he visited New Orleans and had the eminent Dr. Stone, a noted surgeon, examine his wound. After a painstaking examination, he advised Captain Myatt not to allow any further examinations to be made, stating that they would be futile and of no avail, and might lead to complications that would endanger and shorten his life. However, notwithstanding this advice, the almost constant pain caused him on several occasions to visit other physicians, among whom the noted Jno. Calderwood, of Monroe, examined him on several occasions, always taking the view of the case previously expressed by others.

Now comes the strange feature of the case.

After all these long years this man, carrying a Springfield rifle ball so near the most vital part of his body, suffering untold pains, consulting at different periods some of the most scientific surgeons of the country, and all to no purpose, except occasional temporary relief, was to be at last relieved by a dentist, one who has attained eminence in his profession.

During the fall of 1898 Captain Myatt called on Dr. C. B. Johnston, of Monroe, La., to have him remove what Captain Myatt supposed to be a broken tooth. But, to the surprise of the patient and operator, in place of a broken tooth a leaden substance was discovered. Captain Myatt was so much surprised at this information that he was indisposed to give the statement any credence, and was not led to a full belief in the story until Drs. T. O. Brewer and R. W. Faulk, his family physician, were called, who, after an examination, assured him that such was the fact. Dr. Johnston, who made the discovery, assured Captain Myatt of his ability to remove the bullet, but as Captain Myatt strenuously objected to the use of chloroform or any other anesthetic, and the operation necessarily being painful and tedious, Dr. Johnston wired to his brother, Dr. J. F. Johnston, also a skilled dental surgeon, to come and assist him. Together the Doctors Johnston, by a process of sawing and

drilling into sections this bullet, in the course of two or three days removed from Captain Myatt's mouth what had been a source of pain, amounting at times to almost torture, covering a period as far back as the siege of Vicksburg. This operation was so skillfully performed as to give the patient but little pain.

These dental surgeons have not only contributed largely to the lustre of their profession, but they have added untold happiness and comfort to one worthy of a better fate than has been allotted to Captain Myatt in the past. This old veteran tells me that since the removal of this ball, or bullet, he has enjoyed life more than all the balance of the time since receiving this wound. He weighs twenty pounds more than he did when the bullet was removed, and, although now sixty years of age, he has gone into the battle of life with renewed vigor and energy.

Let the lovers of the dental profession and the lovers of humanity thank the mother and father of the Johnston brothers for the production of men so able and competent in their profession.

Dr. C. B. Johnston: I will now give my treatment of this case. After removing the bullet with my engine, dividing it into several parts, my first idea was to close the opening from which the bullet was extracted. But that was not practicable. Next I thought of making an artificial substitute, but abandoned that for fear of an abscess resulting, and you all know a dentist's love for an abscess. I finally adopted the following plan, and as there are so many of the dental bright lights present I would like for them to speak out, for if I have made any mistake it was of the head and not of the heart. If any mistake was made, I wish to correct it as soon as possible, both for my own information and for the welfare and comfort of my patient.

After removing the bullet, by cutting it into several pieces, I first washed out the opening with peroxid of hydrogen, and then packed it with dry cotton thoroughly impregnated with iodoform, removing dressing, washing the opening, and replacing the aforesaid dressing about every week or ten days. After the sixth or eighth dressing I discovered there was some little necrosed bone, some of which nature has thrown off. By careful examination you will see there is still some of this bone, but my idea is to give time and assist nature all I can to throw this off, as stated before.

Captain Myatt dreads and is afraid to take chloroform or to allow the use of cocain.

Now, gentlemen, I ask you to discuss this case freely, and to criticize any answers I may make to any questions that may be asked by you. A piece or two of dead bone has been removed, or rather thrown off, since the operation, a small piece coming through the nose. The patient is now doing well and has enjoyed life much more, and his health is better than at any time since receiving the wound.

He weighs twenty pounds more than he did when the operation was performed. With Captain Myatt's consent, whom I now introduce to you, I will take pleasure in showing you the place from which the bullet was taken and also the bullet itself.

Trusting that I have not encroached too much upon the time of the Association, I thank you, gentlemen, for your kind attention.

Report of Committee on Operative Dentistry.

By J. G. FIFE, D.D.S., Chairman, Dallas, Texas.

Mr. President and Gentlemen: As chairman of the Section on Operative Dentistry, it is incumbent upon me to make a report as to what has been accomplished in the way of securing papers for this meeting, and to review the progress of this section of our profession for the year past. The following members of my committee have promised to contribute papers if possible: Dr. J. Edwin Boozer, Columbia, S. C.; Dr. B. Holly Smith, Baltimore, Md.; Dr. H. D. Boyd, Troy, Ala.; Dr. E. L. Hunter, Fayetteville, N. C.; Dr. L. A. Smith, Port Gibson, Miss.

I hope these gentlemen are present and will favor us by the presentation of their essays as called upon.

OPERATIVE DENTISTRY. A REVIEW.

In attempting to present for your consideration a review of operative dentistry for the past year, I am mindful of the difficulties under which I must labor, for we all recognize that reviews are generally tedious, and devoid of interest to those familiar with the subject reviewed, unless presented in a manner that is in itself entertaining. Although the subject assigned me embodies the history of the progress of this important branch of our specialty, I fear my effort will not be an exception to the rule, as, in a feeble way, I can only hope to recall to your minds some few of the many evidences of our progress.

> "For I have neither wit, nor words, nor worth,
> Action, nor utterance, nor the power of speech
> To stir men's blood; I only speak right on:
> I tell you that which you yourselves do know."

That operative dentistry is synonymous with progress I think is proper to admit, and that this is so is most gratifying to us as a profession, for progress is the opposite from retrogression or stagnation,—it means development. Stagnation and decay never appear until progress ceases. This rule applies to nations of people politically and otherwise. It also applies to dentistry as a profession, as well as to the individual dentist. When effort ceases, the meridian that marks the summit of our progress is soon reached and retrogression commences. This indeed may seem a cheerless picture to the indolent, but indolence should not have and has no proper place among a progressive people. But for the energetic, civilization would not be possible. Suspend it, and the enlightened peoples of the earth would soon revert to barbarism. Dentistry, and more especially operative dentistry, is advancing with steady tread.

While the year just ending does not positively define the limits of any special movement or great reform projected, nevertheless the time has not been without its ear-marks, indicating that we have been journeying toward greater scientific altitudes. It is true that gold is still used where its conspicuousness is a humiliating advertisement of our ignorance, and that we feel the humiliation the more because we are the authors of our advertisements. It is true we must endure our shame until some more scientific brother discovers somewhere within the domain of chemistry, or elsewhere, the "ideal" filling-material.

It is true amalgams still persist in shrinking, expanding, spreading, turning black, and otherwise misbehaving to our mortification. It is true that the cements upon the market seem to be about as unreliable a filling-material as before. It is true that we are still unscientific in our treatment of and filling nerve-canals, there being as many different ways as there are days in the year probably. It is true we have made very little progress in treating successfully that scourge of civilized man, pyorrhea alveolaris. It is also true, no doubt, that many other of our practices are very far from scientific, but it is also true that we have not succumbed to this array of difficulties. It is certain that we are more actively aggressive to-day than ever before; that with intense energy we are busying ourselves with efforts to substitute for gold that which will be less conspicuous; to improve the quality of and the manner of

manipulating and inserting amalgams; to produce a cement that is stable; to improve upon our unscientific methods in the treatment and filling of root-canals; to ascertain the etiology of pyorrhea alveolaris; to produce a line of treatment that, properly followed out, will eradicate this destroyer of the very foundations of the dental organs. In fact, to elevate dentistry as an art and science to the highest possible scientific plane and the dentist to the highest type of manhood. This spirit is commendable and honors the profession.

The most prominent movement in the advancement of operative dentistry, according to my ideas as obtained from its published literature, seems to be in the direction of the artistic; in other words, against the display of gold. Cements and porcelain fillings, especially in Europe, seem to be replacing gold very largely. Porcelain, through the recent improvements made by Dr. Jenkins, of Dresden, both as to its properties and manipulation, seems destined to be of very great value as a filling-material. What these improvements are, or if they are real or fancied, is hardly possible as yet to judge, very few experimenters having reported the results of their efforts. The general plan seems about the same as heretofore,—that is, baking the porcelain in a metal impression of the cavity and cementing in place. We are looking eagerly in this direction, and if the new porcelain body proves to be all that some writers are claiming for it we may expect it to work somewhat of a revolution in operative dentistry.

Amalgams are receiving much attention (thanks to the efforts of Dr. Black and others to improve them), which is bound to bring about improvement in this very valuable filling-material. It has been said that amalgam has saved more teeth than all other filling-materials combined. If this be true with an imperfect amalgam, what may we not expect from it when we have one that does not shrink or expand or spread under pressure of the jaws, and has sufficient toughness not to chip at the edges? Certainly, in capable hands, it would add to the reputation of the dentist as a tooth-saver. These considerations tend to inspire us with hope as we continue to seek through every nook and corner of science for that "pearl of greatest price," the ideal filling. That it may soon be found, "is a consummation devoutly to be wished."

Apparently much thought has been devoted toward efforts at

painless operations. "Cataphoresis" is still with us, and is used by many in obtunding sensitive dentin and nerves for removal. However, I am sure this plan has not met the expectations and hopes of the profession. The time necessary, and the uncertainty of producing the required anesthesia, has operated against its use to a large extent. Nevertheless there are some cases where it is of great value and will help the dentist out of serious difficulties, and for this reason many are still advocating it.

The employment of ethereal solutions of cocain applied upon cotton or spunk to the cavity of decay, and pressed into same by use of a piece of vulcanite gum as a piston, for the purpose of obtunding sensitive dentin or the exposed nerve of a tooth, seems to be meeting with some favor. It is a very simple process, and I have found it efficacious to a marked extent.

The injection of eucain into the gum-tissue as a substitute for cocain in the extraction of teeth appears to be meeting with very general favor. That it is the safer agent there seems to be no doubt. In fact, the reports of the past year indicate that its anesthetic effect, its safety, and the readiness with which it can be sterilized by boiling constitute it a much superior agent to cocain.

The literature bearing upon the subject of operative dentistry during the past year, as a rule, bears evidence of profound and minute consideration of its every aspect. I don't know that I can close this review to better advantage than by mentioning some of the best contributions, according to my judgment, appearing during this period.

First, a series of articles still appearing in the *Dental Cosmos*, by Dr. C. N. Johnson, entitled "A Few Considerations in Filling Teeth"; before the New York Odontological Society, by Dr. Edwin T. Darby, a report and demonstration of "Dr. Jenkins's System of Porcelain Inlays"; "Porcelain Enamel Inlays," by Dr. N. S. Jenkins, of Dresden, Saxony; "Cataphoresis" (Electrolysis), by Dr. W. V-B. Ames, Chicago; "Pyorrhea Alveolaris, with some notes from the practice of the author," by Dr. A. W. Harlan; "Gold not the Ideal Filling," by Dr. Norman W. Kingsley; "Eucain 'A' in Dentistry," by Dr. A. Saloga, Moscow; "A Method of Inserting Gold Fillings with the use of Hand Burnishers as Practiced for Twenty Years," by Dr. Henry F. Libby; "A Restatement of the Tooth-Bleaching Problem," by Dr. Edward C. Kirk;

"Varieties of Dental Calculi," by Dr. Henry H. Burchard; "Filling: Its Success and Failure," by Dr. Jno. E. Wilkinson, Toronto; "Pulp-Mummification," a report of sixty-one cases, with a record of not one failure in three years, after the method of Dr. Söderberg, by Dr. J. A. Woods, Hammonton, N. J.

This last paper treats of a rather novel, if not a seemingly slipshod, method of treating or disposing of the pulp-tissue within a tooth. The plan has been, as seems to me, unfavorably received, but my own experience with probably one dozen wisdom-teeth has borne out the claims of the author. Not one has as yet given trouble. I shall keep these under surveillance for future report; in the mean time, where the patient is a very nervous, timid one, I shall use this method.

In conclusion, let me say that I am impressed with the idea that conservatism in the use of gold in the anterior teeth, including the bicuspids, especially in the use of gold crowns, marks the present status and tendency of operative dentistry. The people as well as the dentist are experiencing a change of sentiment. The former, from observation, note the inartistic effect upon others, and people of refinement are loath to have themselves so mutilated. Of course, we cannot yet, if ever, dispense entirely with these valuable conservators of badly broken-down teeth, but if this sentiment against the vulgar display of metal can be made to extend through the people to that class of dentists who glory in the glitter of their handiwork, we can then congratulate ourselves that we are indeed progressing.

DISCUSSION.

Dr. M. S. Merchant: I consider this a most admirable report. We all object to the glitter of gold, which is so embarrassing to patients, but we have nothing reliable with which to replace it. The cements have thus far been failures, and even inlays depend upon the integrity of the cement for their durability. When there is no strain upon cement it is pretty and perfect in appearance, but we cannot get strength enough upon the articulating edge to withstand the strain of mastication. I have been using an amalgam for the past eight months which claims to be free from the objections to most amalgams; but a year is not enough to enable us to pronounce upon the merits of an amalgam. As far as eight months can prove anything, it is eminently satisfactory, but it must

stand a longer time test before I feel ready to pronounce upon it. As to the inlay work, I am led to believe that European operators, while highly scientific, have not the manipulative ability possessed by American dentists, which is the reason why they turn more to porcelain inlays than do our more skilled operators in gold. In regard to anesthesia by cataphoresis, it consumes too much time, and the results are too uncertain. I prefer to use cocain for pulp anesthetization. I dip a bit of sponge in alcohol and then in cocain crystals, using some soft substance as a piston to force it into the pulp. I have done nothing in the line of pulp-mummification, as proposed by Söderberg; I fear the ghost of that buried pulp would rise up and haunt me. It is too much on the order of the embalmed beef we are reading so much about. I look upon good crowns as the greatest discovery in modern dentistry, in the proper place, though it is true that many teeth that might and should be saved by filling are mutilated and cut down for the more mechanical process of crowning. We should fill teeth as long as it can possibly be done; but when the choice lies between extracting the roots or crowning them, then the crown is the best thing we can have.

Dr. H. J. McKellops: It seems so strange to me that so little is said of platinum gold in the discussion of operative dentistry. I defy any one to detect a platinum gold filling in a front tooth; there is no display or glitter of gold; it is simply a restoration of contour, perfect in color, and which withstands any wear that may be put upon it. As to gold crowns, I look upon them as a curse to the profession; they have served to destroy the operative skill of many good men; they are only fit to be made and used in a quack shop, where good, strong teeth are cut off that gold crowns may be put on as an advertisement. I have found it difficult to induce manufacturers to continue to put out the platinum gold, there is so little demand for it. Why don't you use it? Why don't you use more oxyphosphate? You can renew that year after year, and the teeth need never be lost. If you choose, you can put amalgam over it in very deep cavities, and it stops the decay. There is not so much money in it as in big gold fillings, but it keeps the teeth perfect in appearance, which under gold fillings would continue to decay. You can use platinum-gold if you have a little bit of skill. Why don't you do it, and do yourselves, your profession, and your patients the greatest good?

Dr. H. W. Morgan: We have with us a gentleman who has made very extensive investigations on the subject of cements; I refer to Dr. Ames, of Chicago. I hope he can be induced to speak to us on that subject.

Dr. W. V-B. Ames: My experience leads me to consider the field of porcelain inlays as rather circumscribed. If we were given a body of ideal tints and texture their use would still be limited, because of the nature of the material. I believe that the gold inlay or cast gold filling is applicable in nine cases where the porcelain will answer in one. There is not the strength in the material which is called for with occlusal surface anchorages, and for the infinite variety of extensions which become necessary in the proper formation of cavities. I hope that there is more in the Jenkins material than appears to be the case from my limited observation. The tints and texture seem to leave much to be desired.

Possibilities are great with the material so strongly recommended by Dr. McKellops. With his ability to manipulate platinum and gold foil I would be as enthusiastic. In the January number of the *Dental Review* is published a paper read by me before the Chicago Dental Society in which I described the building of various classes of gold inlays or restorations, building out to proper contour with crystal gold or platinum sponge, and filling the interstices with solder. With the platinum sponge the same effect can be obtained in this process as with the platinum and gold foil, as advocated by Dr. McKellops.

I have been making gold inlays since 1889. The results must depend largely on the integrity of the cement. When I began with the method I used Justi's oxyphosphate, and soon became convinced that the cement feature was warrantable. The Justi oxyphosphate not being an ideal material in connection with surfaces which are to be brought into close apposition, I have been led to do much experimenting in quest of as reliable a material with which an inlay or crown might be readily forced entirely home. If the cement is right we can rely on most excellent results from gold inlays, but you must have a safe joint. (In reply to Dr. Merchant.) The ability to force a crown or inlay home depends upon qualities in the liquid, as well as upon impalpability of powder. If the powder is fine and the liquid properly compounded for the purpose, the cement can be made to flow from beneath the crown or inlay so that it

will go entirely home, which cannot be the case with a coarse powder or gummy liquid. As I now use cement of my own make only, I do not like to say much on this point.

Dr. T. M. Allen: I have been using platinum-gold, as stated by Dr. McKellops, since 1875, when I first saw Dr. McKellops use it. It is difficult to manipulate, but when you have once acquired the art corners can be built out with pure gold and finished with platinum-gold; and as it comes in three shades, it is easy to select one to match the tooth and not have at all the appearance of gold. It takes longer to work than gold, but it gives fine results. Corners of incisors can be built on that withstand all the wear of mastication.

Dr. T. P. Hinman: With regard to porcelain inlays, I will say that I am working the Jenkins system of porcelain inlays with very fair results. I have several now in the mouths of my patients, upon which I expect to report later. It certainly appears to promise more than any inlay system heretofore offered us. The material is very dense, and is not injured by frequent bakings; the color is not baked out. The only care necessary is not to carry it beyond the actual fusing point. In approximal fillings the inlay should be made one or two shades lighter than the tooth, as the shadow of the opposite inlay makes the shade appear off color. The inlays are retained with cement. Opticians' cement has been advised. It is a pure balsam, and does not affect the translucency of the enamel. I am giving this a trial, and will report later.

Dr. L. G. Noel: I would like to ask Dr. Hinman about the opticians' cement he mentioned. What is it, and how is it used? Does it require heat in working with it?

Dr. Hinman: It is used by opticians for fixing lenses; it is perfectly transparent and semi-liquid. It is a pure Canada balsam, dissolved in ether or chloroform.

Dr. Noel: If it would withstand solvent action it might perhaps be valuable for filling root-canals.

Dr. Ames: Five years ago Dr. Harlan advocated the use of Canada balsam for setting inlays, but, as he has not mentioned it since, I doubt if it proved satisfactory.

Dr. Fife: I desire to thank Dr. McKellops for his remarks. When I get home I shall certainly undertake to build my corners with platinum-gold.

Combination Fillings.

By Dr. L. A. SMITH, Port Gibson, Miss.

THE combination of different filling-materials indicates clearly the want of an ideal not only as to color, but one that will withstand the destructive agents and rough usage to which fillings in teeth are subjected; and which shall have that property which induces and assists nature to self-protection.

Before speaking of the various filling-materials and their different combinations, though I shall not attempt to mention all of them, I shall speak of the conditions which do and *may* exist under fillings and the analogy borne by the hard (tooth) tissue to that of the soft tissues in some of nature's processes.

That portion of a tooth that comes in contact with a filling does not remain normal; by calcific deposit it becomes denser than the normal tissues. The reverse of the above *may* be the result, or rather is possible.

The first process mentioned bears analogy to that of encysting foreign bodies by the soft tissues. Encysting is not nature's only method of disposing of foreign bodies. If too incompatible there is a breaking down of tissue, and the offending body is thrown off. Is it possible that this last process may sometimes be exhibited in tooth-structure?

All fillings act as irritants, to a greater or less degree, to the exposed tissue. Too much irritation we know is objectionable, but a proper amount is necessary, as the tooth throws out a protective layer about the filling, thus becoming stronger and rendering fillings more serviceable. This is one of the ways in which the filling induces nature to respond to her own defense.

Cement fillings, on account of color, adaptation, and adhesiveness, would take the lead as nearest the ideal were it not that it yields to the influences of the agents against which it should stand guard.

But, in combination with amalgam, some of its good qualities may be had and a better filling made, where color is not objectionable, than by either material singly. Having cavity—approximal, bicuspid, or molar—prepared, and material all ready, mix cement, discretion as to consistence, placing sufficient quantity in center of cavity, spreading slightly; begin filling with soft amalgam; first piece large enough to form a layer over bottom of cavity; pressure with a suitable instrument should be made at proper points to more firmly fix amalgam to cement.

Burnish the filling from within outward, being careful to leave no cement at margin of cavity or feather edge to amalgam. Sufficient shoulder should be left at cervical border to prevent amalgam being forced out. Unless cavities are large and tooth needs strengthening, only a small quantity of cement need be used.

Argument as to the advantage in this combination I think unnecessary.

Some operators use gold and cement before cement sets, but I prefer, where I have to make a combination of gold and cement, to wait until the cement is hard.

Amalgam and gold are used in combination for different purposes. Amalgam for its antiseptic properties, or as protection at the cervical border, or as a time-saver, and in building up teeth that the all-gold worker would cap with a gold crown.

That the combination (gold and amalgam) has the antiseptic property, or bears that relation to tooth-structure that induces and assists nature to overcome caries, will not admit of doubt.

As in the case of cement and amalgam, the best qualities of both materials are obtained. It would seem superfluous to add another metal to such a combination of metals as amalgam, to which scientific men have given years of thought and labor in preparing it to meet the requirements of a filling. Yet experience has proven the wisdom, and the gold is only added, not mixed, at the weak points in amalgam fillings,—namely, the cervical border and one-third of walls adjacent or cervico-buccal, or cervico-lingual, as may be, and crown. A case: approximal cavity of bicuspid or molar; cavity prepared as for gold. Having been separated with cotton, a matrix reaching half the length of tooth, with upper edge beveled from inside, is held in place with small wedge, as close to cervical border as possible, to allow matrix to prop back against adjoining tooth.

Begin filling with soft gold pellets pressed in place with a piece of kid, or with a ribbon of soft gold of proper width and length to cover bottom of cavity and one-third walls on either side. Amalgam is added until cavity is half or two-thirds full, and filling finished with gold. The approximal surface should not be finished until the amalgam is hard, when it may be separated and polished.

Very large crown fillings may be made by filling cavity two-thirds with amalgam, and burnish gold in until all surplus of mercury is taken up, when cavity can be finished with mallet, as in full gold filling.

It is not best in all cases to finish with gold before amalgam is hard. Amalgam makes a good patch for gold fillings, and gold makes a better patch for amalgam than fresh amalgam.

Of the combination of tin and gold I have little to say in its favor, as results at my hands have not been satisfactory. Failure to get the proper proportion probably was my trouble.

DISCUSSION.

Dr. J. Y. Crawford, Nashville, Tenn.: I always listen closely to any paper that is read, and if I do not always agree with the essayist I mean no offense. I have been subjected to influences that have combined to make me something of an iconoclast. We say so much that we do not really mean; we make so many mistakes; we all need correcting.

Now, as to the treatment of dental caries. I acknowledge I do almost want to lay violent hands upon the essayist for some of the positions he has taken. But you all know my views upon the subject of amalgam. The essayist dwelt largely upon the therapeutic value of filling-materials. We take them up one after another; this one first, that one next, then that one, and so on along the line; but in my estimation amalgam is not the last on the list; it is not on the list at all. If forced to put it on the list I should certainly place it at the tail end, where it belongs, if anywhere.

As I object to amalgam *in toto*, I of course object equally to the combination of amalgam with either gold or cement. Whenever amalgam and gold can be used, either tin or gold, or tin and gold combined, will meet all requirements. It has always been taught that tin must go next to the cervical border, which is the weak point, and gold in the middle of the cavity. But for eighteen

months I have been running contrary to this rule, and put the gold next to the cervical walls, and I have not observed that it turns dark. It is the tin next to the cervical margin that turns dark, and looks like a line of black caries. For eighteen months I have reversed the practice, and I believe there is something in it; and I have less annoyance when I put the tin in the center.

As to certain agents stimulating activity in tooth life and causing certain protective deposits, I believe these deposits are made in spite of rather than because of the presence of the irritating agents. If the pulp is stimulated to unusual activity, pulp-stones are the result. Irritation of the pulp is a different thing from irritation of the dentin, and the products are very different. Instead of finding a zone of resistance in the best quality of teeth, we find a hypersensitive zone. Secondary dentin is the result of hypersensitiveness rather than of an atrophic condition. The teeth that are most virulently subject to decay are those that are hypersensitive. Often a patient will stand the first operation well; the second and third less and less so, until finally they refuse to have anything more done, because the suffering is too extreme. There are times when the patient is more subject to caries, no matter what we may do; and again they seem to reach a period of immunity. We, as a profession, should not forget that in our treatment of the teeth we may bring about conditions that stimulate powers of resistance in the teeth themselves, by which their subsequent integrity is maintained. The ideas of the essayist as to the effects of the cements will not do; they won't do—I say it with all kindness—they won't do; don't waste time on it.

Dr. L. A. Smith: Do I understand Dr. Crawford to say that the thickened condition of the dentin under the filling is the result of the filling?

Dr. Crawford: The irritation caused by the filling causes the thickening, as Dr. Smith terms it.

Dr. Smith: I cannot agree with that, for if a cavity is made clean and kept perfectly clean, but is not filled, the same thickened condition of the dentin will occur as if it had been filled. There is less thickening under a gutta-percha filling than under cement. It sometimes happens that some change of conditions in the patient cause a cessation of caries when the same thickening or increased density occurs.

Thoughts on Measuring and Preparing Approximo-Occlusal Cavities in Bicuspids and Molars.

By LAURENCE LEONARD, Waseca, Minn.

THE principle of measuring cavities in teeth is comparatively new, and is probably practiced, and hence appreciated, more in Minnesota than in any other State of the Union.

Those who take the time to measure cavities soon learn to look upon the work of preparation as being a highly mechanical and scientific procedure, and soon learn to love geometry and physics and the subsequent noting of the longevity of the filling. Let it be said that the person who measures the cavities which he prepares will soon, if he has not already done so, learn to love the actual labor which it entails as does the sculptor love his hammer and chisel. The person who cannot interest himself in the mechanical work *per se* must needs find it difficult and laborious, and must needs perform it inaccurately and imperfectly. The one is scientific and sublime, the other empirical and ridiculous.

It is probable that one of the most important measurements is that of the width of the cavity bucco-lingually. This importance comes from the fact that approximal cavities heretofore filled have shown their greatest weakness bucco-cervically and linguo-cervically, and from the necessity of having some average width bucco-lingually, which, as a rule, may be followed. Sixty almost ideal cavities were prepared and measured by your essayist, and which gave an average of nearly two-thirds the width of the tooth, as the following tabulation shows:

TABLE—GIVING AVERAGE MEASUREMENTS OF SIXTY CAVITIES.

Superior Bicuspids.			Superior Molars.		
Width of tooth.	Mes. Cav.	Dis. Cav.	Width of tooth.	Mes. Cav.	Dis. Cav.
9.1115	$5\frac{5}{10}$	$5\frac{7}{8}$	11.24375	$7\frac{1}{16}$	$7\frac{1}{25}$
$\frac{2}{3}$ Rule.....6.0743			$\frac{2}{3}$ Rule.....7.4958		

Inferior Bicuspids.			Inferior Molars.		
Width of tooth.	Mes. Cav.	Dis. Cav.	Width of tooth.	Mes. Cav.	Dis. Cav.
8.25	$4\frac{6}{10}$	$6\frac{1}{10}$	9.9763	$6\frac{7}{10}$	$6\frac{1}{6}$
$\frac{2}{3}$ Rule.....5.5			$\frac{2}{3}$ Rule.....6.65		

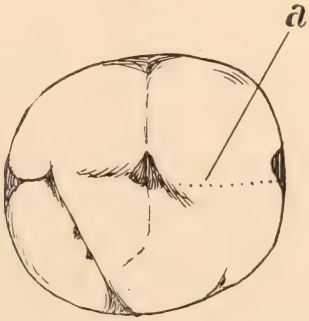
In July, 1897, the essayist read a paper before the Pacific Coast Dental Society in which he gave this same rule, or two-thirds average. The article was published in the *Stomatological Gazette*, of San Francisco, in October of the same year. The December *Dental Cosmos* contains an article by another dentist arriving at the same two-thirds rule, entirely unconscious of my previous finding. This is a coincidence of more than passing importance, as it shows that the disciples of Dr. Black find it necessary to "extend for prevention" their cavities two-thirds bucco-lingually the width of the tooth. If Drs. Black, Johnson, and other scientific men would give us their cavity measurements they too would undoubtedly corroborate the same two-thirds rule; *e.g.*, if a bicuspid were nine millimeters wide, the cavity should be six millimeters; if an inferior molar ten millimeters wide, the cavity should be six and two-thirds millimeters; and if a superior molar were twelve millimeters wide the cavity would be eight millimeters wide bucco-lingually.

The profession should certainly adopt some average measurements for those common cavities, hundreds if not thousands of which are being filled every day, and those measurements should be taught in our colleges on the same principle that average doses of medicine are taught. Thus there would be uniformity in the conception of what ideal cavities are. Of course these ideal cavities could not always be followed, but, nevertheless, the ideal cavities should be known. It is impossible to know imperfection if we do not know what perfection is.

We have probably all seen "specimen fillings" brought in extracted teeth to our meetings,—done at leisure in the laboratory, when all mechanical and scientific principles should have been observed,—and yet no two of the same class of cavities were anything near alike. The width of one perhaps three-fourths, the width of the other one-fourth, and the general shape prepared by the rule "be guess and be guess," or wherever the instrument penetrated the easiest. Let us have some rule of measurement and formation, so that if a dentist were to bring before this meeting one hundred cavities of the same class for inspection they would all be found very near alike.

A few words as to the method of preparation. The essayist would recommend, as far as possible, the discarding of the bur and

Fig. 1.



the employment of the chisel and stone. Burs cut dentin very nicely, but for enamel they are not suitable. We grind glass, diamonds, etc., but it is impossible to bur them.

For the opening of these cavities which we are considering there is nothing equal to properly-shaped and directed chisels, struck by a quick, elastic blow from a hand mallet. If so done, enamel whose underlying dentin is at all softened will split like Southern pine; but it must be struck with the grain, not against it, nor partly against it; it must be struck scientifically.

As to the preliminary opening of the step, it is perhaps the most trying to the operator and most painful to the patient, especially where there is no decay or fissure. (Fig. 1, *a.*) To remove this portion of enamel the essayist has found the use of a small corundum wheel, kept cool and moist with water, or a small diamond

wheel, an invaluable method. (Fig. 3.) Grinding pulpally until the dentin is reached (which is readily recognized and manifest by the patient), after which the remaining short portions of enamel-rods can easily be torn from their fastening by an inverted cone (Fig. 4), cutting, at the same time, the floor of the step cavity, the only place where an inverted cone is permissible in these cavities.

Fig. 3.

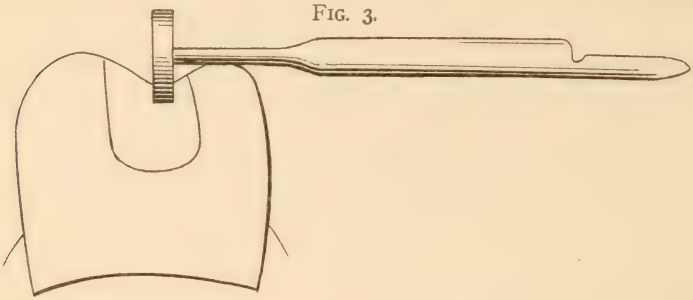


Fig. 4.

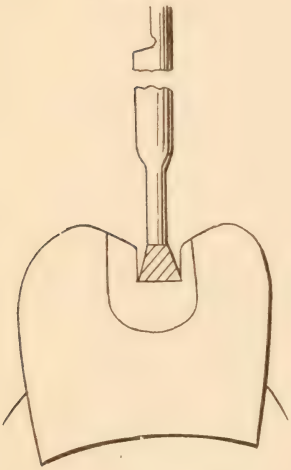
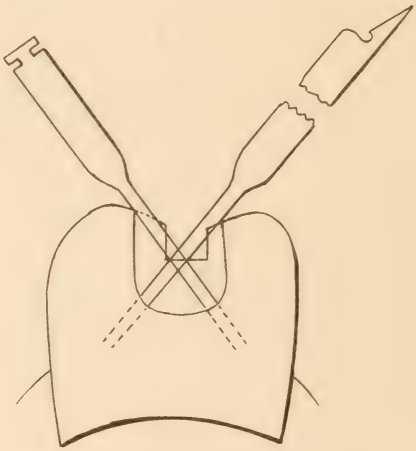


Fig. 5.



Now as to preparing the cervico-axial angles. As up to this time there has never been any scientific test, each dentist has his own particular way.

Your essayist has conducted a series of experiments upon ivory, using the different engine instruments which are generally used in cutting dentin. The experiment was conducted in such a manner that the pressure on the bit or bur was mechanical, and the same throughout the different tests, thus eliminating personal equation.

TEST No. 1.

Thickness of Ivory, 3½ Millimeters.

Round Revelation Bur	No. 6	40 revolutions.
" " "	" 6	38 "
Inverted Cone Revelation	" 4	145 "
" " "	" 4	153 "
" " "	" 2	204 "
Round Revelation Bur	" 2	600 "
" " "	" 2 stopped	200 "
Spear drill	" 2	25 "
" "	" 2	20 "
" "	" 2	14 "
" "	" 2	14 "
" "	" 2	16 "

TEST No. 2.

Thickness of Ivory, 1 8-10 Millimeters.

Round Revelation Bur	No. 6	15 revolutions.
" " "	" 6	16 "
Inverted Cone Revelation	" 4	39 "
" " "	" 4	34 "
Round Revelation Bur	" 2	10 "
" " "	" 2	10 "
Inverted Cone Revelation	" 2	60 "
Spear drill	" 2	5 "
" "	" 2	5 "

So, you see, for direct penetration, the best instrument is a drill. For shallow penetration, say from one to two millimeters, the next best is a round bur and the poorest is an inverted cone.

FIG. 6.

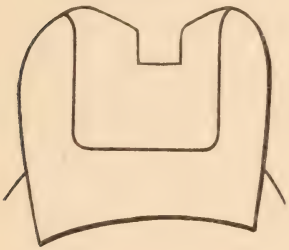
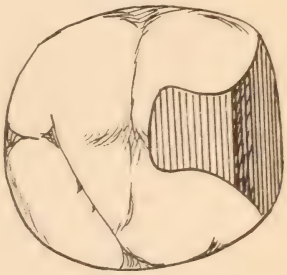


FIG. 7.



It follows, then, that the least painful way to prepare these angles, linguo-axio-cervical and bucco-axio-cervical, is to first cut at the desired angle and depth with a spear-shaped drill (Fig. 5), after which a bur can be inserted into the bottom of the holes made by the drill, and lateral or drawing cuts made in the periphery of the

dentin, as indicated. The unsupported cervical enamel can then be easily and painlessly removed by means of properly-shaped cervical chisels.

Figs. 6 and 7 represent the finished cavities according to my rule and method.

DISCUSSION.

Dr. J. Y. Crawford: This paper has been carefully prepared and well presented, but I take exception to these classified measurements and dimensions. In filling teeth we desire to prevent contact between adjacent teeth; that is the ideal requisite in a filling. By virtue of the fact of the great variety in teeth, we will never be able to do that to the extent desired. The bulk of us here in the South cannot get such a paper in our minds exactly. Not one per cent. of us know what a millimeter is. I don't know! I prefer to use the old term, inches, though it is getting quite common to use the term millimeter, and I have an idea that it averages perhaps the one-thirty-second of an inch. Dr. Smith, what is a millimeter?

Dr. B. Holly Smith: I have been severely called to account for calling names upon this floor, and I ask the gentleman to retract his remarks. Dr. Crawford has no right to endeavor to draw me into this discussion. (Laughter.)

The Chair: Speakers must confine themselves to the subject of the paper.

Dr. J. Y. Crawford: I asked the question because the millimeter has been made very prominent in this paper, and I want to know what it is. I am afraid when my wife reads this discussion she will ask me what it is, and I want to be ready for her. In this question of shaping cavities I am reminded of the backwoods fellow who advertised, "My plugs don't come out because I make the hole bigger at the bottom than it is at the top," and that is about all there is to it. Get all the decay out, and shape the cavity so that the plug can't get out, and you beat science all hollow. Let me tell you something about preparing cavities. One of the greatest hindrances is the difficulty of doing the work as we know it should be done. The kind of mechanics taught in this paper is not the mechanics that dentists need. I will illustrate it by the work you can see just now going on all over this city,—laying cobblestones. You see a man at work; he has laid stones here and stones there, and there is one hole for him to fill. He looks at the hole and he

looks around at the pile of cobblestones, and he picks up one that will fill that hole. He does not stop to measure the hole and then measure the stone. But aside from this there is valuable teaching in that paper. That corner (pointing to diagram) serves the object of the old retaining pit; it makes a pot-leg. Years ago we dug a hole here and a hole there, and made spreading pot-legs to hold our fillings in, but where are they in dental art to-day? I tell you the general dentist is not going to do all that measuring. What we need to discuss is the occlusion of the teeth; not as we find them before our fillings are put in, but after they have been moved and their positions changed. A large proportion of the teeth that are lost are lost through their migrations and changes of position.

Dr. Geo. B. Clement: The object in running down into that corner (pointing to diagram) is simply to have two points from which to run a level floor. I use a disk in cutting back, but for opening up the cavity a sharp drill works more rapidly.

Dr. H. A. Smith: The paper under discussion is eminently scientific in many points.

The statements in reference to the relative efficiency of cutting instruments used in excavating cavities, based as they are upon carefully conducted tests, are most interesting, and will prove profitable to all of us. To the dental student especially will they prove valuable, in fixing the habit of choosing the most efficient and time-saving instruments for the work at hand.

Reference has been made to the use of corundum wheels and points in cavity preparation. Dr. Brophy, some years ago, called attention to corundum forms for this purpose. In certain direction in cavity preparation I have found corundum forms valuable, especially from the humane standpoint. In their use the minimum amount of pain is inflicted.

The essayist has given some definite rules for cavity preparation upon approximal surfaces in bicuspids and molars. To some the methods advocated may appear too radical. Usually the margins of fillings are real danger lines. In mouths in which predisposition to caries is strong the only safety we have against recurrent decay is to extend the borders after the manner illustrated by the essayist. In my judgment, the method of "extension for prevention" has come to stay.

Dr. F. C. Wilson: I wish to ask the essayist how the pressure upon the bit or bur was regulated in the test excavations in ivory.

Dr. Leonard: It was regulated mechanically and with great exactness, so that every revolution with each bur was registered.

Dr. M. S. Merchant: I like the shapes of the cavities and I like the method of preparing the cavity, but I do not like making so large a filling when the decay does not call for it. Such very large metal fillings are liable to be affected by changes in temperature, causing expansion and shrinkage. The tooth is also weakened by having so much good material removed. I do not think I would always make my cavities two-thirds the size of the tooth, unless made necessary by the removal of carious dentin.

Dr. H. W. Morgan: I desire to thank the essayist for his elaborate exposition of this subject. If I were to make any criticism of the diagrams, it would be on the line that Dr. Merchant has spoken, with the exception that I would extend the cavities even farther than as shown in the diagram. I desire to thank Dr. Leonard for his clear and lucid exposition of the method of entering cavities. Some years ago my attention was called to the spear-shaped drill (which should always be kept very sharp) for undermining the enamel. It is necessary to have an instrument that cuts rapidly and accurately, and always in the line of cleavage of the enamel. For these reasons the value of the proper enamel chisel cannot be overestimated. It is necessary to have a thorough knowledge of the histology of the tooth. We must know just in what direction the enamel-rods run. This branch was for a long time neglected in our college curriculum, but now its practical utility is recognized, and in our histological laboratory students are trained to a clear knowledge of the lines of cleavage of the enamel-rods in the different portions of the tooth, and thus many mistakes are prevented. Extension for prevention has come to stay. We have learned that we must anticipate what may occur in the future. We no longer merely remove the actual decay. We penetrate the dentin, not to obtain undercuts, but to prevent recurrence of decay. We know what portions of the tooth are liable to be imperfect in structure and where future decay should be well guarded against. In the establishment of the step and the planning of a flat floor I heartily agree with the essayist. The consideration of the bucco-gingival angle is of the utmost importance,

as here we not infrequently come in contact with a horn of the pulp, and here again our knowledge of histology stands us in good service.

I must differ with the gentleman who said that the first object in preparing a cavity was to get rid of the decay. There are several things to be considered before we remove the carious tooth-structure.

We must first outline the cavity, then look at its shape with reference to the stress the filling will have to bear, its retention, convenience of preparation of the cavity, and introduction of the filling-material, especially in those cavities in which we are in danger of exposing and infecting the pulp. The removal of the decay should be put off to the last minute, until after these conditions have been considered.

Dr. W. C. Barrett, Buffalo, N. Y.: I appreciate your courtesy when you ask me to speak, but I am not sufficiently familiar with the subject to attempt to illumine the minds of those present, so many of whom I know to be far superior to myself in these practical investigations. I will not, therefore, attempt to speak along this line. Dr. Crawford asked, "What is a millimeter?" I suppose he meant by comparison with the old system of linear measurement. As near as we can get at it, it is the thirty-nine-one-thousandths part of an inch; but that does not appeal to the uneducated mathematical sense. The millimeter, as its name indicates, is the one-one-thousandth part of a meter. The latter is the unit of length of the metric system, based on the measurement of a meridian of the earth's circumference, and a little more than thirty-nine of our inches. The meter is divided decimally into decimeters, centimeters, and millimeters. I appeal to the dental profession to join with all other scientific bodies in the adoption of the metric system in place of the old arbitrary systems which we all remember as they were drilled into us in the school-room of our early days, with the confusing tables of "long measure," "square measure," and "cubic measure"; its "troy weight," "apothecary's weight," "avoirdupois weight," etc.

Dr. A. R. Melendy: Yesterday we were criticised for using unscientific methods in treating root-canals, but those methods were once taught in our dental schools. I have been very much interested in this essay, and I am sure we all feel indebted to the

essayist for presenting the subject in such a scientific manner. Here we have the average measurements by which we can regulate the size and shape of our approximo-occlusal cavities. I think that I have averaged about the same proportions, but I have never measured the teeth or the cavities by millimeters, or by any other scientific method. I feel sure, however, that this is a step in the right direction. I believe, also, that it will help us to attain more scientific methods in filling root-canals.

Dr. B. Holly Smith: I think the essayist is working in the right direction. He is following closely along the lines indicated by Dr. Black. I have been particularly interested in the line of selection of instruments and the amount of execution to be accomplished by the different kinds of instruments. Such instruction is very valuable, and such essays tend to modify our practice. But it really seems to me that I am too busy to measure teeth and proportion my cavities as the essayist teaches. I looked into Wedelstaedt's methods, and tried to decide that they might be essential to success, but I could not decide that cavity measurement was an essential to success.

Dr. Ames: A few months since Dr. G. V. Black read a paper at Fort Wayne, Ind., before a local society, on "Extension for Prevention; When and Where to Practice." As it was read before a small society, I fear it may not be published, but if it is I fancy that it will be found to contain much which will reconcile skeptics to his teachings. This two-thirds linguo-buccal dimension seems to be the same as Dr. Wedelstaedt advocated some time since. I could not work to any set rule as to this extension, but I should say that two-thirds would be a minimum, more rather than less being most frequently demanded. Many teeth have not this rotundity (pointing to diagram), not this knuckling contour, and therefore they need greater extension. In my gold inlay work, in which restoration is so easy, I always extend the cavity to afford opportunity for natural cleansing. I hope, with Dr. Barrett, that we will some day be more familiar with the meter and gram than with the inch and ounce.

Dr. H. W. Morgan: I would like to ask the essayist if he has any rule as to the extension of the cavity linguo-buccally.

Dr. Leonard: The cavity should be extended farther lingually

than buccally. Decay extends more rapidly lingually than buccally. It has been suggested that this is due to capillary attraction.

Dr. H. W. Morgan: The reason I ask this question with reference to the rule is that Dr. Black's rule with reference to mesial cavities in molars and bicuspids is that the extension should be lingually to the point at which the filling can be seen on a line with the junction of the mesial surfaces of the central incisors.

It must be remembered also that the teeth do not decay at the exact point of contact, but always gingivally from the point of contact, and if this gingival wall is laid sufficiently low the interproximate gum will come up and protect it, and when the extension is sufficiently lingually the tongue will keep this margin clean.

Dr. J. Y. Crawford: I ask consent to add a word. All that is in the paper and in the diagram is open to discussion. I would rather have the floor of the cavity a little rounder than so flat or level. If it were rounded, there would be less liability to recurrence of decay. Why are the bicuspids so often lost after they have been filled? Because the opponent comes down between the cusps like a wedge, a break follows, and the cusps will be broken off about half-way from the coronal and to the gingival margin. If prepared as shown in the diagram, it would be split off below the gingivæ. We need to study the etiology of the case below the gingival margin. We want to be able to say where we reach the point of apparent immunity. At the bucco-palatine surface we have got to make a square cavity. If caries has taken a semi-lunar form we have got to make it a square-end cavity.

Dr. Laurence Leonard: I am very much pleased with the discussion which has followed my paper. You have taken cognizance of the fact that these are exact scientific tests. There is a great deal in the preparation of a cavity, and science is tearing down many ideas that are old and have long been adhered to. In endeavoring to make my paper as brief as possible I have not, perhaps, made some points as clear as I should have done. Any operator who, in shaping an approximal cavity, does not so place the filling that the excursions of food will keep the surfaces clean does not do his full duty to his patient, and the filling can only be called a temporary one. It is true that teeth break away from a filling occasionally, but do they break any oftener, or as often, as they decay? Are they not more liable to decay than they are to

break? This question of fracture is a case of "strain at a gnat and swallow a camel."

Dr. Crawford's statement that he would have the cervical floor of the main cavity rounding—which form induces decay and rocking of the filling—is so contrary to clinical observation and to the teaching of our professors of operative dentistry that it deserves no further answer.

As to the use of the drill, to which Dr. Smith has referred, I may say that I was forced to experiment with it to avoid a duel, and now I am glad that I was. A drill is what is needed for penetration. The carpenter uses a twisted drill called an auger; the blacksmith and all mechanics and manufacturers, when they need to penetrate deeply and quickly, use a drill and not an inverted cone. It is a wonder we have not "tumbled" to the principle sooner that the drill is the instrument for penetration, not the inverted cone, which wiggles, as it has no central point to guide it as has the drill and auger. Two years ago Dr. Bonwill said to me that he used the drill almost exclusively. I did not understand then, nor did he scientifically, but now I do. The tests speak for themselves. I hope the diagrams have made clear what I have failed to put in words.

Chemistry, Metallurgy, and Anatomy.

Report by Dr. A. B. KING, Chairman, Baltimore, Md.

MR. President and Gentlemen: The year 1898 has been quite an interesting one in the science of chemistry, great progress having been made in the discovery of new elements, no less than six having been reported, to which names have been given as follows: Krypton, Neon, Metargon, Coronium, Polonium, and Etherion. The evidence that these new elements have been discovered is rather meagre as yet, and the existence of some of them may be open to doubt.

The three elements first named were discovered by Prof. Wm. Ramsey, of London, who in 1895 discovered Argon; the three substances were all found with Argon, after it had been isolated from liquid air.

Polonium is the name of an element not yet isolated, but which M. Curie reported to the French Academy of Sciences he had discovered in the form of a sulfid in pitchblende. The new element is said to resemble bismuth chemically, and its radiating power is placed at four hundred times that of uranium. M. Becquerel reported two years ago that the salts of uranium threw off an invisible radiance much like that of the Roentgen rays; and a variety of pitchblende has been discovered by M. Curie to possess that power to a much greater degree.

Coronium is an element shown only thus far by the spectroscope, and only in the solar atmosphere. It has been found three hundred thousand miles from the sun's surface, and is believed to be much lighter than hydrogen.

Etherion is the name given by Mr. Chas. F. Brush, the well-known electrician, to an element which he thinks he has discovered in the atmosphere. It is far lighter than hydrogen, and its heat conductivity is a hundred times as great as that of hydrogen. He estimates that its molecules vibrate with a velocity of one hundred miles a second, and thinks it is not confined to the earth's atmosphere, but extends indefinitely out into space.

Your committee have been unable to learn if any uses have been made of these elements, but we are convinced that there have been none, since all the information we have received relates merely to their discovery.

Quite a number of interesting experiments have been made during the past year with liquid air, one of which was recently reported by Prof. R. Ogden Doremus, of New York, which consisted of fastening a diamond in a coil of platinum wire and heating to a white heat by the electric current; then immersing it in the liquid air, when the diamond burned with dazzling brightness until it was entirely consumed. He also states that he made the same experiment with nitrous oxid gas with a similar result.

The work upon the proteids, their decomposition and digestion products, has been exhaustively studied during the past year. One of the most interesting studies is that of Kutscher upon the body named by Kühne Antipeptone. According to Kühne and his school, the digestion of proteids by pancreatic juice takes place according to the following scheme: Native proteid, Dentero Albumose, Amphopeptone. Working from the solubilities and precipitations of the bases hitherto discovered as products of digestion upon proteids, he came to the conclusion that antipeptone might contain several of these bases.

The result of his work may be given as follows:

First. In the trypsis digestion of fibrin there result among the organic bases Lysin, small amounts of Histidin, and considerable amounts of Arginin.

Second. According to their solubilities, these must be present in the mixture of bodies known as antipeptone.

Kühne's procedure for the preparation of antipeptone yields a mixture of heterogeneous substances, among which the hexone bases are present in considerable amounts.

The synthesis of proteids has been claimed, but by others disputed, so that for the present the question must remain undecided.

The only matter of any importance that your committee has been able to find on anatomy is in the article by Black in the *Dental Cosmos* for February, 1899, in which the writer claims to have discovered a series of glands in the peridental membrane with ducts leading to gingival margin; being unable to find any other authority on their existence, we submit the same without argument.

A Case of Defective Tooth Development.

By L. M. COWARDIN, M.D., D.D.S., Richmond, Va.

MISS Y., age fourteen years and ten months. Permanent superior centrals, in place and well developed, took the place of the temporary teeth about the ninth year. Temporary superior laterals and cuspids still in place and quite firm, showing no signs of absorption of their roots; nor is there any sign of the approach of the permanent teeth, which should have taken their place some years ago, except the right cuspid, yet to be matured. These temporary teeth are badly disfigured by caries, as they were not cared for because it was thought that they would be replaced. The second right superior temporary molar is still in place, badly decayed, and shows signs of absorption of its roots; but the thinness of the gums above them does not indicate the approach of the second bicuspid. First temporary superior molar was lost about three years ago, and has been replaced by a well-formed cuspid. Both left superior temporary molars were lost between two and three years ago, and the thinness of the alveolar ridge does not intimate or give the slightest sign of their approach. Both right and left first and second superior permanent molars are in position and well formed, having been erupted at the usual age. The four inferior incisors and two cuspids came in position, taking the place of the temporary teeth at from six to twelve months later than the usual time; but they are well developed and in good condition. Both right inferior temporary molars gone, having been lost three years ago. There is no sign whatever of approaching bicuspid. First left temporary inferior molar still in position; quite firm in the alveolus, but the bone beneath it is so thin that there is no indication of an approaching bicuspid. The

second left inferior temporary molar was lost about two years ago, and there is no sign of an approaching bicuspid. This young lady is next to the youngest of twelve children, and is well developed, has a good figure, and enjoys good health, and but for the condition of her teeth would make in every respect a beautiful woman. No other member of the family has suffered from any such defect in their teeth. I have not yet been able to learn whether or not she had any of the eruptive fevers during the age of tooth development.

This case proves that we should not be too sure that temporary teeth will be replaced by permanent ones, and impresses the importance of preserving temporary teeth.

Pathology, Materia Medica, and Therapeutics.

Report by H. H. JOHNSON, D.D.S., Chairman, Macon, Ga.

To the President of the Southern Branch of the National Dental Association: As Chairman of the Committee on Pathology, Materia Medica, and Therapeutics, I beg to make the following report: I wrote many letters urging my committeemen to contribute something for this meeting, but got only a few responses, and these were of a negative character. Rather than have the committee come up without anything at all, I have undertaken the task of writing a short paper, entitled "Notes on Materia Medica, with Comments and Criticisms," which I shall impose on the Association for the reason given, and not for any intrinsic value it may possess.

According to your instruction, I have also hurriedly scanned the most important of the current literature which has appeared since our last meeting, and have noted the original articles of any importance which seemed to have a bearing on this subject (Pathology, Materia Medica, and Therapeutics); and have made a compilation in the shape of a subject index, that any one desiring to do so may readily refer to them without trouble. As a further reference I have noted below a few of the articles some of the most important points treated of therein. Space would not admit of a more extended review.

On materia medica and therapeutics I would respectfully direct your attention to the following articles as having sufficient merit to be noticed:

"Formagen, Practical and Theoretical Trials," by Max Bauchwitz, Stettin, Prussia. Successfully and immediately relieves the

pain of an aching pulp, and the tooth may be filled at once. Is not to be used in periostitis, and does not injure plastic fillings. *International Dental Journal,* Vol. xix, No. 6, p. 358.

"Oil of Cloves as an Obtunder of Sensitive Dentin by the use of Cataphoresis," by Harry N. Jackson, Milwaukee, Wis. Successful case reported. *Dental Cosmos,* Vol. xl, No. 4, p. 332.

(Cocain) "Hypodermic Local Anesthesia as Practiced in Europe," by Paul Gires. Recommends recumbent position, and one per cent. solution. Holocain hydrochlorid found to be more diffusive, and used where an extensive operation is to be done. *Dental Cosmos,* Vol. xl, No. 5, p. 349.

"Cinnamon Oil," by Harry B. Hickman, of Philadelphia. On account of its containing tannic acid and a yellowish volatile oil, has found it to discolor teeth. Very effective as an antiseptic. *Dental Cosmos,* Vol. xl, No. 5, p. 416.

"Boric Acid for Treating Antrum Trouble," by E. W. Bonwill, Rangoon, Burma. Successful cases. *Dental Brief,* Vol. iii, p. 127.

"Eucaine." Reports of cases by Blotz. Two hundred cases reported; all successful. Conclusions are that over three grains should not be injected at one time. Discovered nothing objectionable except a little harmless swelling at the point of injection. *Dental Cosmos,* Vol. xl, No. 3, p. 246.

"Coagulation Theory of Medicines; Antagonistic Views," by H. T. Smith, Cincinnati, Ohio. *Dental Cosmos,* Vol. xl, No. 4, p. 286.

(Heat) "The Application of Heat for the Destruction of Pathogenic Germs," by J. H. Wooley, Chicago. Contends that heat and dryness is our greatest germicide. *Dental Review,* Vol. xii, No. 3, p. 172.

"Iodoformagen Cement," by Otto Bickel, New York. This is a cement made by Abraham (Berlin). It is incorporated with formaldehyd, and the essayist claims that congested pulps may be capped with it and they will return to a state of healthfulness without further treatment. *Items of Interest,* Vol. xx, No. 4, p. 244.

"Creasote and Iodin in Alveolar Abscess," by P. H. Jones, Clear Lake, Iowa. He recommends the saturated solution, as recommended by the late lamented Atkinson. Gives this caution,—never use where tannin has been used, as it produces an inky blackness which cannot be removed. *Items of Interest,* Vol. xx, No. 4, p. 272.

"Oxid of Zinc and Eugenol," by S. B. Luckie, Chester, Pa. Claims that a good quality of oxid of zinc mixed with eugenol to consistence of stiff dough will harden in a root like other cement, forming an antiseptic for nerves or root filling. *Items of Interest,* Vol. xx, No. 7, p. 490.

"Formaldehyd as a Practical Disinfectant for Instruments," by E. G. Horton, B.S. This is a scientific essay of merit, with results of experiments with the tabulated form, with extensive quotations from authors. *Dental Cosmos,* Vol. xl, No. 7, p. 537.

"Formalin, use of," by J. H. Allen, Washington, D. C. *Dental Cosmos,* Vol. xl, No. 12, p. 855.

"Eucain in Dentistry," by A. Solaga. An exhaustive treatise with experiments and results. *Dental Cosmos,* Vol. xl, No. 12, p. 1054.

"The Importance and Manner of Sterilization of Dental Instruments," by L. A. Meyer. *Dental Review,* Vol. xii, p. 803.

"Materia Medica and Therapeutics," by J. S. Cassidy. *Dental Digest,* Vol. iv, p. 595.

"Paraform and its Uses," by A. A. Fowler. *Indiana Dental Journal,* Vol. i, p. 963.

"Hydronaphthol," by H. T. Dean. *Dental Review,* Vol. xii, p. 753.

"Arsenic in Cements, Presence of," by A. B. Howatt. *Dental Record,* London, Eng., Vol. xviii, p. 405.

"Pulp-Mummification *vs.* Science," by F. A. Brosius. A general review of the subject as presented by some European writers. *American Dental Weekly,* Vol. i, p. 305.

"Arsenious Acid, Action of on the Dental Pulp," by D'Argent. *British Journal of Dental Science,* London, Vol. xli, p. 193.

"Coagulants, the Use of in the Treatment of Pulpless Teeth," by F. D. Murto. *Ohio Dental Journal,* Vol. xviii, p. 228.

"Formaldehyd," by A. H. Peck, Chicago. *Dental Review,* Vol. xii, p. 356. Deals with its antiseptic and irritating qualities.

"Formaldehyd, Its Use in Dentistry," by H. Prinz. *Dental Review,* Vol. xii, p. 507.

"Coagulants, Why They Diffuse through Dentin," by E. L. York. Combats all former theories that they do not, with experimentation. *Dental Review,* Vol. xii, p. 496.

PATHOLOGY.

"The Mouth a Human Culture Tube," by F. B. Reese. *Dental Register,* Vol. lii, p. 306.

"The Bacterial Factor in Phagedenic Pericementitis," by E. C. Kirk. A scientific and theoretical treatise on the causation of abscess upon teeth with living pulps, with extracts from other authorities. *Dental Cosmos,* Vol. xl, No. 11, p. 969.

"Syphilis, Manifestations of in the Mouth," by L. Duncan Bulkley, A.M., M.D. Gives a thorough elucidation of the subject; gives the diagnostic signs; calls attention forcibly to the dangers of contracting the disease in dental operations. *Dental Cosmos,* Vol. xl, No. 6, p. 431.

"Phagedenic Gingivitis, Contagious," by J. Falero, City of Mexico. Gives a clear and interesting description of the appearance and progress of the disease, with the necessary treatment. Diets patients, prohibits use of tobacco, uses wash composed of carbolic acid and potassium chlorate, cauterizes patches with nitrate of silver. *Dental Cosmos,* Vol. xl, No. 6, p. 456.

"Syphilis, Buccal Manifestations of," by F. D. Weisse, M.D., New York City. Gives careful diagnostic signs in the different stages, and also diagnostic signs of hereditary conditions, as indicated about the mouth and teeth. *Dental Cosmos,* Vol. xl, No. 6, p. 436.

"Maxillary Sinus, Suppuration of," by H. J. Kelsoe. *Dental Headlight,* Vol. xix, p. 174.

"Pulpless Teeth, Management of," by J. Taft, Cincinnati. *Dental Register,* Vol. lii, p. 468.

"Syphilis," by F. R. Wright, M.D., Minneapolis, Minn. An exhaustive treatise on the origin, diagnostic signs, dangers of contracting and communicating, and other matters of interest to dentists. *Dental Review,* Vol. xii, No. 1, p. 10.

"Antrum of Highmore," by C. M. Palmer, Charles City, Iowa. Treats of the anatomy, diseases and treatment of the antrum exhaustively, with reports of five cases. *Items of Interest,* Vol. xx, No. 7, p. 496.

"Alveolar Abscess and Caries of the Maxilla," by W. G. Chase, Princeton, N. J. A voluminous treatise. *Items of Interest,* Vol. xx, No. 11, p. 825.

"Pyorrhea Alveolaris," by A. W. Harlan, Chicago. *Dental Cosmos,* Vol. xl, No. 7, p. 543.

"Leucoplakia," by Dr. Jno. S. Marshall. Gives a minute description of the disease, causes, symptoms, diagnosis, and treatment. *Dental Cosmos,* Vol. xl, No. 10, p. 836.

"Alveolar Pyorrhea," by G. H. Thompson. Advances the uric acid theory, and advocates pyrozone, followed by listerine. *Dental Cosmos,* Vol. xl, No. 4, p. 304.

"Abscess Upon Teeth with Living Pulps," by D. D. Atkinson. A review of the subject as advanced by E. C. Kirk, with additional information. *American Dental Weekly,* Vol. i, p. 605.

"Antrum, Abscess of," by R. B. Bogle. Report of a case. *Dental Headlight,* Vol. xix, p. 175.

"Pyorrhea Alveolaris," by W. G. Beers, Canada. Gives his personal experience in treating the disease. *Dominion Dental Journal,* Vol. x, p. 387.

"Implantation of Sterilized Roots of Animals' Teeth Carrying Artificial Crowns," by W. E. Walker. Transactions American Medical Association, 1898, Vol. xxx, p. 726.

"The Essential Oils and Some Other Agents; Their Antiseptic Value," by A. H. Peck, Chicago. Gives results of extensive experiments to show the relative strength of different well-known agents as antiseptics. Shows oils of cassia and cinnamon to be the most potent agents, with beechwood creasote following close behind. Shows formaldehyd to be less potent than bichlorid of mercury. *Dental Cosmos,* Vol. xli, No. 1, p. 61.

All of which is respectfully submitted by the committee.

Dr. Frank Holland: The essayist is to be congratulated upon this thorough review of the literature of materia medica and therapeutics for the past year. I move you, Mr. Chairman, that the report be accepted with the thanks of the Association, and recommend that it be published in full in our Transactions, as it will be invaluable for reference as an index to the literature of the subject.

Resolution adopted.

Notes on Materia Medica, with Comments and Criticisms.

By H. H. JOHNSON, D.D.S., Macon, Ga.

AMONG the ideas and suggestions advanced in this paper, very few claims for originality will be made; the object being rather to call attention to a few new preparations and to revive interest in some older ones, which may have been displaced by new ones possessing less meritorious points of excellence.

In this very progressive period of scientific research so many new and wonderful chemical combinations are formed and brought to our attention by the pharmacists of the world, each having its claim for superior merit in some specific case or cases, it cannot result otherwise than in confusion to the most learned and scientific mind. Indeed, the desire to produce new compounds of a confusing nature has become so strong as to almost amount to a rivalry with the chemical companies.

An extract from the *Hospital,* a London publication, says "that England, Germany, and America are three countries which deluge medicine with physiology good, bad, and indifferent, but mostly bad; which flood it with literature in the shape of medical books with no soul of either science or practice in them; which evolute new remedies, not by the score, but by the thousand, annually, not one of which in fifty is worth so much as a second thought. The inevitable effect of all this upon the average mind in the profession is either to suffocate and so paralyze them with what appears to be a new knowledge, or else to so disgust the practitioner that he makes up his mind never to read at all and on no earthly consideration whatever to experiment with a new drug. Medicine, in short, is swamped, drowned, stifled, and paralyzed by innumerable

exploiters within and without its ranks; exploiters whose only object is the shortest possible cut not to fame and fortune, but to notoriety and pelf. Now all this has an exaggerated sound about it, but indeed and in fact it does not express one-tenth part of the miserable truth."

It will readily be seen that the foregoing remarks are as applicable to dentistry as to medicine, and consequently are worthy our consideration. I would very much dislike to be understood as opposing any honest effort for an honest purpose in this direction, but I am constrained to believe that many of these new combinations are pressed forward solely for the purpose of gain, without a due regard for any special merit they may possess. As the length of overcoats changes from year to year without any scientific reason (the temperature varying but little), to extort money from the man of fashion, so are these new compounds rushed forward as money-makers; and the man who suffers most from such imposition is the live, progessive fellow who feels that he must try every new thing that he may not be accused of being backward in his practice. A little thought on this line will readily convince one that the dental supply houses are not entirely exempt from criticism just here. They, too, often push forward an appliance or preparation, generally something catchy and of small value, either without having had it tested or without due regard as to its real practical value. The progressive man invests fifty cents or a dollar for experimental purposes, finds it worthless, lays it aside, and promptly discontinues its use, but, through modesty, says nothing more about it. Probably ten thousand other practitioners have done the same thing, realizing a fair profit to the manufacturer, yet not much loss to any one person. But does the fact that small sums have been obtained from a large number relieve the stigma of dishonesty of purpose?

But I am diverging, and must return to my subject. In dental materia medica antiseptics occupy probably the most important position of all the medicines used, and demand the most careful study and discrimination. Those of us who have attempted to follow our leading investigators on this line, to try and determine the merits and demerits of antiseptic medicines used in dentistry, have had our minds somewhat confused by the different results of their experimentation. Theory and practice are so widely divergent in actual results obtained that even an artificially demonstrated theory

cannot be accepted *in toto* until its correctness has been proven by passing through the actual experimental stage. The science of the practice of medicine has always progressed by actual practical experimentation on living organisms, and always must. The phenomena of life are so wonderful and its workings are so complex and unapproachable by any known artificial means that such artificial experimental applications, it matters not how carefully made, upon devitalized tissue can never be hoped to produce the same results as actual experimental applications to living tissue. For this reason such artificial experimentation must always produce dissimilar, unproven results, which invariably ends in confusion of ideas.

We have this state of affairs now in regard to antiseptics. One of our deep investigators, who has spent much time and thought in this work, has proven to *his* entire satisfaction that certain long-used antiseptic preparations, as carbolic acid, should not further be employed in treating septic conditions as they exist in devitalized teeth, for the reason that by their power to coagulate albumen they set up a barrier on coming in contact with the albuminous matter in the pulp-chamber and nerve-canal, which effectually prevents their proper diffusion throughout the dentinal tubuli of the teeth. Another investigator, by very similar experiments, proves that the coagulum formed by these certain preparations *does not* act as a barrier to their diffusion, as the coagulum is not impenetrable to the medicine itself, it being redissolved after being formed and the agent readily diffusing through it. Thus in trying to follow and profit by the experiments of these learned men, who believe that they each have proven the correctness of their theories beyond a doubt, we find ourselves suddenly at sea. But we need not be discouraged. We can assume that *either* theory is correct, and if we use judgment we can save teeth with any one of the well-known antiseptics of the materia medica. Take carbolic acid or creasote, for instance; they have been longer and probably more extensively employed than any others, and have had more abuse on account of their coagulating powers; and yet they have been instrumental in saving more teeth in the past than any other known antiseptic, and accomplished it under the most trying circumstances. The older practitioners, who relied largely on these preparations, did not have the improved instruments we have now (thanks to Drs. Donaldson,

Gates, and Evans), and yet they saved many teeth in a perfect state of preservation and usefulness in spite of the fact that these medicines coagulate albumen. Probably the mechanical preparation was so perfect there was not very much albuminous matter left there to be coagulated, assuming, of course, that the coagulum would be a barrier to diffusion. Carbolic acid and creasote have a place in my medicine cabinet yet, and I intend to use them to a limited extent in the future as in the past.

Of the older preparations familiar to dentists, aromatic sulfuric acid is among the most valuable. Its tonicity, astringency, acidity, and freedom from discoloring stains are most valuable medicinal properties. In opening very foul pulp-chambers and nerve-canals, where there is danger of septic poisoning at the apical foramen from the entrance of septic matter into the apical space, there is nothing any better. Flood the cavity with it and it immediately loosens up this gummy mass, rendering it possible to wash away the greater part of it with warm water and a syringe. It is a germicide, and quickly attacks and renders inert any septic matter with which it comes in contact. While its action on tooth-substance is very slow, only a reasonable time should be allowed before counteracting its influence with bicarbonate of soda. If a recently devitalized pulp is to be removed an application of aromatic sulfuric acid, worked up into the canals with a smooth instrument first, will cut loose the adhering attachment of nerve sheath, causing it to come out whole and intact, leaving the canal clean and white. If a canal is to be filled with cement which has been treated with oily substances, wiping out the canals with aromatic sulfuric acid previous to introducing the cement will cause it to adhere firmly to the walls, facilitating its introduction. For destroying abscess sacs and producing exfoliation of dead bone it is very reliable. If a bridge or crown is to be set with cement, if the surfaces of the teeth be wiped over with this preparation it will cause the cement to adhere to the surfaces of the teeth with a tenacity that is remarkable. It is useful in pyorrhea pockets, cutting loose serumal calculus, and by its tonic, astringent properties adds tone to the tissues.

TRICHLORACETIC ACID.

Trichloracetic acid used full strength is a most powerful escharotic and styptic. It immediately destroys hypertrophied gum-tissue, which is often found to have grown up and filled large cavi-

ties of decay. If this tissue be *cut* away, the hemorrhage is so profuse it is often necessary to postpone the filling until some future day, thereby sacrificing valuable time. By an application of trichloracetic acid this tissue may be removed in a few minutes without the slightest hemorrhage. As a *first* application to pyorrhea pockets it is very effective, cutting away any serumal or salivary calculus, cleansing the surface of the alveolus and destroying any diseased tissue lining the pocket. Subsequent applications should be greatly diluted, being not stronger than four per cent. solution. As an application to weeping gums it will be also found to be very effectual. Where its full escharotic action is desired without destroying the tissue, the application can be made full strength, following with bicarbonate of soda to counteract the effect.

IODIN.

A more effectual remedy than the old aconite and iodin mixture is the following:

℞—Tinct. iodin,
Tinct. aconite,
Tinct. can. indica,
Tinct. benzoin com., āā parts. M.
Sig.—Apply locally.

For pericementitis and pulpitis, applied to the gum several times a day, if necessary, as a counter-irritant and aborter of a forming abscess, there is nothing better. In inflammation about crowded erupting third inferior molars and in relieving the after-pains from extraction, its action is prompt and most effectual. It may also be employed with great success in the treatment of incipient pyorrhea alveolaris and kindred troubles. In making the applications the surfaces should be kept dry for a minute after to facilitate absorption. It should not be carelessly applied to an abraded surface, for fear of too much of the aconite and cannabis indica being absorbed.

Iodin and beechwood creasote made into a saturated solution is an old remedy advocated by the late Dr. W. H. Atkinson, who recommended it for treating pyorrhea alveolaris and chronic abscesses. It has an intensely black color, and is of a syrupy consistence, with an unpleasant, pungent odor. It is a valuable remedy, but unpleasant to use. Abscesses will sometimes yield to it with one treatment where they had resisted other medicines persistently.

FORMALIN.

Formalin, formaldehyd, formic aldehyd, etc., has recently received much notice as an antiseptic and germicide. It may be obtained in a forty per cent. solution of the gas formaldehyd in water, which is a neutral, colorless, volatile liquid with a pungent odor and somewhat irritating taste.

"Formaldehyd," says Lilly, "has the chemical property of uniting with sulfuretted or nitrogenous products of decay, fermentation, or decomposition, forming true chemical compounds which are odorless and sterile; and these compounds are in most cases actually antiseptics themselves. It is from this property of combining chemically with albuminous or nitrogenous bodies that formaldehyd derives its germicidal and bactericidal powers, since bacteria and micro-organisms generally are not only albuminoid in character, but their food is mainly albuminoid; and when formaldehyd is present it combines with both the bacteria and their food, thus destroying them as well as the possibility of their existence."

"For sterilizing cavities," says Dr. H. Jerome Allen, "it is valuable in a twenty per cent. solution, particularly if the cavity is large or any softened dentin is allowed to remain as a protective covering to the pulp. When the pulp is exposed a weak solution (about two per cent.) should be used to flood the cavity before capping. After the arsenical application has been removed from devitalized pulps they may be hardened to a leathery consistence and removed intact by enlarging the exposure and sealing in a pledget of cotton saturated in a twenty per cent. solution for three to six days." Dr. Allen also advocates the twenty per cent. solution in putrescent canals, and incorporates some of the paraform (a concentrated powder) with the powder of the cement before mixing for filling the roots.

Dr. E. B. Edgars says that formalin full strength applied to an exposed pulp will stop pain when all else fails. This statement might be questioned, however, as it is known that formalin is an intense irritant to flesh, and might be expected to produce that effect on exposed pulps.

Dr. Peck, of Chicago, in some interesting experiments, found that formalin in weak solutions was not as powerful a germicide as some other of the well-known antiseptics. His experiments seemed to prove that bichlorid of mercury was over four times as potent

an antiseptic as formalin in the same strength solutions. On account of its powerful irritant qualities, he does not consider it a proper agent to use in treating pulpless teeth.

Formalin, while non-poisonous, should always be used with great care, on account of its being such an intense irritant to flesh. Repeated applications to a part full strength will cause death and sloughing of the part.

EUCAIN.

My experience with this drug has not been extensive, but my limited use of it has impressed me very favorably. Used in a slightly stronger solution it will give all the results that can be obtained by cocain as a local anesthetic, and from the experience of those who have experimented with it extensively I am prepared to believe that the dangers from toxic effects are not as great by half as when cocain is used. As now prepared, in the form of eucain B, it is less irritant to the flesh than formerly, and possesses about the same anesthetic properties as cocain. It possesses one valuable feature over cocain, and that is that the solutions may be boiled, thereby making a sterile solution without the addition of other agents. All solutions should be used comparatively fresh to get positive results.

A. Salaga, in the *Therapist,* gives some very interesting comparative results from the use of the two drugs in Professor Bobrow's surgical clinic at the University of Moscow, which, although they have already been copied in several journals, are so interesting and convincing I shall venture to reproduce them here for discussion. A record of seven hundred and forty-five cases was kept. Without anesthesia there were fourteen cases of nervous disturbance, as slight giddiness and one actual fainting, which made 7.3 per cent. Under cocain there were effects ranging in severity from slight giddiness to cocain poisoning in one hundred cases, or 46.8 per cent. Artificial respiration had to be resorted to in several cases to bring the patients back to consciousness. Of the three hundred and twenty cases under eucain there were eight slightly affected, or 2.5 per cent. It will be observed that the number affected by eucain was much less than when nothing at all was used, while the solutions injected were more than twice as strong as the cocain solutions. This would seem to prove that eucain, instead of causing, acted as a preventive to the nervous disturb-

ances incident to the excitement of the anticipation of an operation. The only bad effect reported by Salaga was a slight painless swelling at the point of injection, which rapidly subsided, leaving no after-effects.

Blotz, after using eucain in over two hundred cases, reports in its favor. The only unpleasant symptom experienced by him was the slight harmless swelling in the injected part.

Dr. C. G. Edwards, of Louisville, Ky., reports that he has used eucain for more than six months, and had extracted more teeth in that time than for two years previous. He extracted nine and eleven respectively for two patients, using two syringes full for each patient of a five per cent. solution, and no unpleasant effects were noticed except the slight swelling mentioned by Salaga and Blotz.

Dr. Keisel, of Berlin, says he has used eucain for more than three years to his own entire satisfaction, as well as that of his patients. He finds it to exhibit much less toxicity than cocain, and out of one hundred and twenty-two cases in which he used the eucain B he only had the swellings at the point of injection in three cases, and thinks probably these were caused by the needle not being in perfect order.

MILK OF MAGNESIA.

Before closing this paper I would like to again direct attention to that splendid antacid, Phillips's milk of magnesia. Though a proprietary medicine, it is one of such value I do not consider it a breach of professional dignity to speak of it and recommend it in a paper of this kind.

In all acid conditions of the secretions of the mouth, whether it be caused by indigestion, gestation, the accumulation of fermentable food-stuffs, or from acid secretions at the necks of the teeth from any of the forms of gingivitis, milk of magnesia will readily and effectually correct the trouble. Every woman during the period of gestation, and all other persons who suffer with acidity from whatever cause, should at all times be armed with litmus paper and a bottle of milk of magnesia.

I have had patients with teeth so sensitive about the gum-margins they could not bear the contact of the bristles of the brush, and after using milk of magnesia for thirty-six hours, internally and as

a dentifrice, they were able to brush their teeth with great comfort. Being palatable and pleasant when prescribed, it is very much more likely to be used as directed than any of the lime or soda solutions I have ever been able to have prepared.

DISCUSSION.

Dr. W. C. Barrett: I scarcely feel able to do justice to this essay, which is a very valuable paper. I am very glad indeed to be here with my Southern brethren, not as the "brother beloved," at our meetings, and "a villain unhung" should you enter my home and come in contact with me and my business, as is too often the case with us.

The history of medicine may be traced back to the earliest times. The profession of to-day is an evolution from the ignorance of the dark ages. Disease was formerly supposed to be a demoniac possession that might be frightened away by infernal noises; they even went down into Hades to get the devil to drive the devils out; they gave a devil a dose of the most nauseous remedies to disgust the nasty demons,—the first instance, perhaps, of the pronunciamento *Similia similibus curantur.* We are only now beginning to conceive of the therapeutic value of remedies, and that certain agents have a specific action on specified tissues or organs. In the past, medicine has been altogether empiric. It has offered an immense field for rogues and rascals. With the evolution of the coal-tar products the invention of new remedies received a great impulse. The combinations of the different agents are almost infinite, producing the most different results. Advertising circulars by the bushel and samples by the waste-basketful come into almost every office daily. Most of these are only made to sell; there is no demand for them, no need for them. Many of those that become the most popular through persistent advertising and giving away of samples are the least fitted to attain the object they profess to accomplish.

I most heartily commend the paper from this standpoint; the author has not been imposed upon by the manufacturers. Sometimes a pretended formula is given, but that is safe enough, because no one else would ever want to make it up. It is quite as easy to invent a new combination. We have enough old remedies that are tried and true, that have stood the test of years of usage.

No man would dare say that carbolic acid is not beneficial, although it has been greatly abused. It derives its chief value from being a coagulating agent; the paper is very clear on that. From the little knowledge I have acquired, and its application in my practice, I have learned that the first step necessary in the removal of the albuminous contents of the dentinal tubules is coagulation, which is the first step in the melting-down process. Hence the very fact that carbolic acid is a coagulant is one reason why I use it in the treatment of root-canals, and I do not expect to abandon the use of this old and tried agent. Many forsook it when it was demonstrated that it was a coagulant; but albumen must be coagulated before it can be melted down and gotten rid of. The arguments that are used do not always harmonize with the facts in the case.

You have all heard of the old syllogism of the man who went over into the sweet bye-and-bye, and there called for a fluid, which was not whisky, nor beer, nor brandy. He demanded only *water;* therefore, urged the topers, it is only the teetotalers who reach the place of torment. Well, that chain of reasoning seems as cogent to me as the condemnation of carbolic acid because it is a coagulant.

Tincture of iodin is another old friend of mine; it has been one of my closest intimates for many years. I often use tincture of iodin to inject into root-canals when there is tumefied induration. Why? Because it promotes absorption. Tincture of aconite is another reliable remedy, which is constant in its action upon terminal blood-vessels. It is also useful as a counter-irritant. Do not let us abandon these old and tried remedies. The claims made for the newer agents are not based upon clinical experience, but upon undemonstrated theory. Relying upon the results of personal experience may not be quite so scientific, but it is eminently satisfactory. I have had no good results from the use of formaldehyd. It is too irritating. The milk of magnesia I believe to be one of the best antacids. A spoonful rinsed about the mouth at night will form a protecting film which in many mouths will remain till morning. As the working formula is given, its use is not ethically prohibited, and we have a reliable antacid in convenient form. This subject is a very broad one. If we were merely mechanics we would do our work with our hands, without the aid of

brains. Mere digital dexterity would be all that would be required. If we are a profession, it is because of our connection with medicine, one of the three mother professions—Law, Divinity, and Medicine. It is true that much of our work is based upon mechanics, but that much is extra-professional. Hence it is our bounden duty to study thoroughly the medical part of our work. The average patient looks upon the average dentist as a person who stuffs holes in molars and puts in "store teeth." But a paper like this imparts a higher professional tone. We all need to understand the remedies we use and should know how to prescribe them intelligently, according to the pathological conditions. To my apprehension, the time is coming when the diseases of the pharynx and other territories contiguous to the oral cavity will be acknowledged to lie within the purlieus of dentistry. Laryngology is properly a part of oral practice. Who has a better opportunity for seeing down the throat than the dentist? He should be competent to read aright the signs, recognizing all diseased conditions and prescribing therefor. When he has attained to that point, he will rise above the mere mechanic. Not that I would by any means depreciate mechanics; it is the basis upon which all of our substitute work rests, but we must have and be something more. The essayist has presented his subject in such an admirable manner as to be commended almost beyond measure.

Dr. J. Y. Crawford: It is a pleasure to have listened to a paper so classic; to have such a paper to discuss. I am glad I came, if only for this. I am glad to have had such a man as Dr. W. C. Barrett open the discussion of the paper, and I am glad that he commends our old friend, carbolic acid.

As the result, not of a single observation, but of a series of observations, extending over a number of years, I will say that there is nothing so effective as carbolic acid in the treatment of what we used to call abrasure,—mechanical abrasion,—spontaneous abrasion, or, as it is now called, erosion. Take a typical case of erosion, a chemical process when the surface is scooped out in a polished facet, but where there is no point of contact. Institute treatment of the oral cavity by making it aseptic, clean. Then from time to time treat it with carbolic acid, and I believe that careful, accurate observation will show that the process of erosion is checked, held in arrest. If for this purpose alone, I am an ad-

vocate of carbolic acid. I had a typical case,—a patient whose teeth had been so affected for fifteen years, on every surface ever known to be subject to erosion: on the buccal, lingual, and approximal surfaces, and by all the known varieties of erosion—thick grooves close to the gum, facets on the end of every tooth in the mouth. I applied the carbolic acid at first to overcome sensitiveness, as I found that the sensitive erosions were progressing most rapidly, one in particular, a long, oblong groove which had begun at the age of fourteen years. I soon found that under the action of carbolic acid the erosion was to be held in check. After the removal of a pulp, the use of carbolic acid in the canal will aid nature in closing up the apical foramen. There is nothing like sterilized coagulated albumen for the protection of the periosteal or pericemental tissues. Carbolic acid will also abort abscesses in process of formation.

As to the combination of aconite and iodin, the action of iodin is facilitated by the combination with aconite. One of the most important things to be secured for the patient is comfort, and the iodin does that. Let me talk to you all about something to which I have given much study, and that is, the labial pulse on the right side of the upper jaw. Try it two or three times and get its character well fixed in your mind. Now, make use of aconite and iodin, and immediately notice the pulse on the side where you have used it, as compared with the other, and note how quick the response in the labial pulse. The combination of aconite and iodin is more effective than either by itself.

I thank the gentleman for preparing such a paper. It makes me want to go to another meeting where he is to read a paper, for he always has a good one. That man is a great teacher.

Dr. W. C. Barrett: I would say that where not in combination I would give aconite internally and use iodin externally.

Dr. H. A. Smith: The paper just read is one of the best I have heard on the subject.

Dr. Johnson refers to the use of formalin in dental practice. I wish to call attention to formalin as a prophylactic in dental caries, as used by Dr. Hart, of California. He applies formalin to superficial caries, and especially to the felt-like mass of micro-organisms adherent to the surfaces of teeth being attacked by caries, as described by Dr. Williams; and claims the powerful coagulating

properties of formalin will arrest the carious action and for a considerable time prevent its recurrence. For many years silver nitrate has been used for this purpose. Formalin is free from the objection to the use of silver nitrate,—it does not stain the dentin.

I recently treated an incisor tooth which showed a crack in the enamel parallel with the long axis of the tooth. A white spot on the labial surface indicated caries was active immediately under the enamel. Thinking formalin would penetrate through the check in the enamel, I gave the surface a bath with a twenty per cent. solution of the drug. In a short time the whitened appearance disappeared, indicating the action of caries had ceased. Formalin is a powerful irritant, and the utmost care must be taken in its use.

An agent not mentioned in the report is the new obtundent for hypersensitive dentin, vapocaine. My own experience in its use has not been sufficient to give me any decided views as to its efficiency, but reports from dentists in New York and elsewhere lead me to anticipate excellent results from its use. This new agent being a solution of cocain in ether, I have been led to theorize as to its action upon dentin. It is known that dentin contains ten per cent. of water. All of the water of dentin is found in the organic portion of the tissue. When vapocaine is applied to the sensitive dentin the ether volatilizes and leaves the cocain free to fall down in form of granules upon the exposed dentinal fibrils, where it is readily dissolved by the water of the fibrils, and soon the obtundent effects of the drug are manifested. In using an aqueous solution of cocain, we bring the drug to a tissue (dentinal fibrils) already surcharged with water, and there is slight if any effect. Since vapocaine is safe, I think we should use it, and after an extended trial we may be able to pronounce upon its efficiency. As to its precise mode of action, no doubt this too will be made out in due time.

Dr. T. P. Hinman, Atlanta, Ga.: With reference to vapocaine, I have been using it with fairly good results. In one case, when Dr. Frank Holland was the patient, and the cavity very sensitive, I got very good results in five minutes. I presume you are familiar with the literature sent out by McKesson & Robbins, which explains the supposed therapeutic action of this new agent.

Dr. L. M. Cowardin: What appliance is used to apply the vapocaine?

Dr. T. P. Hinman: It is a solution; I saturate a pledget of cotton with the vapocaine, and leave it in the cavity about five minutes.

Dr. L. M. Cowardin: I have some empirical knowledge of formalin, which appears to me to be a rather remarkable agent. I began experimenting with it about two years ago, after a meeting of our State society, where it had been discussed. I was at that time experimenting with a view to a formula for an antiseptic mouth-wash. I found that one-half of one per cent. in a mouth-wash was quite strong, so I reduced it to one-third of one per cent. of the forty per cent. solution as we get it. I have used it personally as a mouth-wash for two years experimentally. In one instance I had been suffering from sensitiveness at the cervical portions of my teeth; after using this mouth-wash I found the sensitiveness relieved, but if I omit the use of it for some weeks the sensitiveness returns. Formaldehyd is one of the most powerful coagulants. It is also evident that it is a germicide, and that it is sufficiently strong to act as a permanent preventive of fermentation, even when greatly diluted. It lessens the sensitiveness of the cervical portions of the teeth by its powerful coagulating action, hardening the organic matter of the tooth. I have used it in root-canals in ten and fifteen per cent. strength. It rapidly deodorizes putrescent root-canals and the odor does not return readily, but it is also apt to produce apical irritation, unless used with great care and not left in the canal. I did not push my experiments in that direction, as I have been fortunate in the use of other methods. But I believe that in formalin we have an agent of great value when properly understood and properly used.

Dr. S. W. Foster: I desire to offer my indorsement of this paper. I have been much impressed with the great amount of information it embodies, and I am especially pleased that our distinguished guests have given this paper their hearty approbation. I had hoped that Dr. Crawford would express his approval of the use of cocain for pulp anesthetization. I think the time has come for arsenious acid to be discarded as an agent for pulp-devitalization, now that we know that the pulp can be perfectly anesthetized with cocain, and removed painlessly. If there is such a degree of

inflammation and engorgement that the cocain cannot be forced into the body of the pulp, the surface can always be anesthetized, and then ethyl-chlorid sprayed upon the pulp surface, when it can be removed without any pain. These agents will not produce pain, used in this way, nor any deleterious effects.

Iodin has long been used, but I have found that the vapor of iodoform, pumped into the tissues, is superior to iodin; it is especially valuable in the treatment of root-canals after the use of the essential oils. We all know how difficult it has been to fill small root-canals, but now, by the use of sulfuric acid, the opening is readily enlarged and our work greatly facilitated.

A knowledge of rational therapeutics is of inestimable value to ourselves and to our patients.

Dr. B. H. Smith: The use of formalin in its forty per cent. solution as furnished to us by Schering & Glatz, will never be adaptable to the living tooth, and especially one that is deprived of enamel. Dr. Jack first suggested the use of formaldehyd to me, and I began to use it without sufficient discrimination, and had serious cases of pulpitis, which would not *down* by any treatment. I do not think we should ever use it as it comes to us. I have seen something of the work done by the gentleman from California, but my impression is that in New Jersey, where he showed his slides, he seemed to decry and belittle the work of a man who has done such signal service to dentistry as Dr. Williams. It was in bad taste, and I have no patience with the prominence given to his work and his method. My friend from Richmond uses one-third of one per cent., and I guess if he had used almost any other agent he would have had about the same results.

Dr. H. H. Johnson (closing the discussion): I have nothing more to say except to thank you for the kind reception accorded my paper, and for the very interesting discussion which it has called forth.

The Fifth Cranial Nerve, Trigeminal; Trifacial.

By Professor WILLIAM S. GORDON, Richmond, Va.

THIS is a very important nerve, interesting to all, and especially interesting to dental students. Its functions are mostly sensory; but, in addition, it possesses motor, vasomotor, trophic, secretory, and special sense functions. Its deep origin and its connections are noteworthy. In arising by two roots it resembles a spinal nerve. The smaller, anterior root, motor, has its nucleus in the floor of the fourth ventricle not far from the middle line, the nucleus itself being connected with the cortical motor centers on the opposite cerebral hemisphere. The descending root, having motor fibers, extends laterally from the corpora quadrigemina along the aqueduct of Sylvius downward to the exit of the nerve. The large posterior root, largely sensory, receives fibers from the small cells of the "sensory trigeminal nucleus," which lies at the level of the pons, being the analogue of the posterior horn of the gray matter of the spinal cord; from the gray matter of the posterior horn of the cord as far as the second cervical vertebra, these fibers appearing as the ascending root; and from the cerebellum, through the crura cerebelli. The origins of the sensory root anastomose with the motor nuclei of all the nerves arising in the bulb except the sixth. Hence the almost innumerable reflex relations of the fifth nerve. The thick trunk appears on each side of the pons, the posterior root forming the Gasserian ganglion on the tip of the petrous portion of the tem-

poral bone, the ganglion being connected with the cavernous plexus by sympathetic fibers. (Modified from Landois.)

This nerve has three large branches; the ophthalmic, the superior maxillary, and the inferior maxillary. In order to facilitate the study of the functions of these branches, I have tabulated them, first naming the branch, then the distribution, and afterward the function.

Ophthalmic Division.

(1) Recurrent.....	Tentorium Cerebelli....	sensory
From the carotid plexus of the sympathetic....	Dura Mater.....	vaso-motor

All of the recurrent branches may be concerned in the headaches, especially neuralgic and vaso-motor, of intra-cranial origin.

(2) Lachrymal.....	Conjunctiva	sensory
	upper lid.....	sensory
	neighboring part of skin over temple.....	sensory
	lachrymal gland.....	secretory (tears)
(3) Frontal *(a)* supra-trochlear	upper eyelids.....	sensory
	brow	sensory
	glabella	sensory
	lachrymal gland.....	reflex secretory (tears)
(b) supra-orbital.....	upper eyelid.....	sensory
	skin of forehead.....	sensory
	adjoining skin over the temple as far as vertex	sensory
(4) Nasal or Naso-Ciliary *(a)* Infra-Trochlear..	conjunctiva	sensory
	caruncle	sensory
	lachrymal sac.....	sensory
	upper eyelid.....	sensory
	brow	sensory
	root of nose.....	sensory
(b) Ethmoidal	tip and alæ of nose outside and inside.....	sensory and vaso-motor (?)
	upper part of septum and turbinated bones.....	sensory and vaso-motor (?)
		afferent reflex secretory for tears
(5) Trophic	eye	from ciliary

The ciliary ganglion, which belongs, probably, as much to the third as to the fifth nerve, we shall study in this connection. It derives its influences from three roots, the short root from the third nerve (motor), the long from the fourth branch (naso-ciliary) of the fifth (sensory), and a sympathetic (vaso-motor) root from

the carotid plexus. Like the other sympathetic ganglia it multiplies the nerve fibers, which, as the short and the long ciliary nerves, perforate the sclerotic. These nerves, which may be considered as the third sub-division of the naso-ciliary nerves, are distributed as follows:

Ciliary	sphincter pupillæ	motor
	tensor choroideæ	motor
	cornea	sensory reflex-secretory (tears) reflex-motor (closure of lids)
	iris	sensory
	choroid	sensory
	sclerotic	sensory
	blood-vessels of iris, choroid, and retina	vaso-motor
	dilator pupillæ	motor from sympathetic

It is thus seen at a glance that the third nerve, the naso-ciliary branch of the fifth, and the neighboring carotid plexus, send their peculiar influences to the ciliary ganglion, which nourishes the nerves, multiplies them, denudes them of their medullary sheath, and distributes them to control the motion, sensation, and vaso-motor functions of the eye.

Superior Maxillary Division.

(1) Recurrent accompanies vaso-motor, derived from superior cervical ganglion of sympathetic	Dura Mater	sensory
(2) Subcutaneous malar or orbital	lat. angle of jaw	sensory
	adjoining skin of temple and cheek	sensory
	lachrymal gland (?)	true secretory
(3) Dental (alveolar)	teeth of upper jaw	sensory
	gum	sensory
	periosteum	sensory
	cavities of jaw	sensory
	fibers from upper cervical ganglion, sympathetic	vaso-motor
(4) Infra-orbital	lower eyelid	sensory
	bridge and side of nose	sensory
	upper lip as far as angle of mouth	sensory
	accompanying artery has from sup. cerv. ganglion of sympathetic	vaso-motor fibers

Spheno-palatine (Meckel's) Ganglion.

Receives	Two roots from second division	sensory (spheno-palatine)
	From large sup. petrosal of 7th	motor fibers
	From sym. plex. on carotid	vaso-motor (deep large petrosal)
Gives off to	roof, lat. walls, and septum of nose	sensory fibers (post and sup. nasal)
	lower and mid. turbinated bones, both lower nasal ducts	sensory (from ant. pal. branch)
	hard and soft palate and tonsils	sensory (from post. palatine)
	Levator palati, Azygos uvulæ	motor (in post. palatine)
	for above area	vaso-motor (from sup. cerv. gang.)
	mucous glands of nasal mucous membrane	secretory fibers
	mucosa	trophic fibers

Inferior Maxillary Division.

(1) Recurrent	Dura Mater	sensory
(2) Muscular	masseter, pterygoid, temporal muscles	motor
(3) Buccinator	mucous mem. of cheek, angle of mouth as far as lips	sensory
(4) Lingual	ant. ⅔ of tongue, ant. pal. arch, tonsil, floor of mouth	sensory and tactile
accompanied by chorda tympani for tip and margin of tongue		taste
(5) Inferior Dental (Alveolar)	teeth	sensory
	gum of lower jaw	sensory
Has from sup. cerv. gang		vaso-motor fibers
Mylo-hyoid branch	Mylo-hyoid	motor
(before entering canal in lower jaw)	Ant. belly of digastric triangularis menti platysma	motor along with musculo-sensory
	chin, lower lip and skin at margin of jaw	sensory (mental nerve)
(6) Auriculo-temporal	ant. wall of ext. auditory meatus, membrana tympani, ant. part of ear adjoining region of temple, maxillary articulation	sensory

Otic Ganglion.

Receives	roots from 3d division (short motor); from plexus around mid. meningeal artery (vaso-motor); from tympanic branch of 9th through small superficial petrosal	sensory fibers
Gives off to	tensor tympani, tensor palati	motor fibers
	parotid gland (fibers joining auriculo-temporal)	secretory fibers

Submaxillary Ganglion.

Gives off to	submaxillary and sublingual glands from branches of chorda tympani	secretory fibers
	blood-vessels of above glands	vaso-dilator fibers
	sympathetic to submental glands, sensory root from lingual	secretory and trophic (?) fibers

Complete section of fifth nerve causes:

Loss of sensibility in	one side of face, temple, part of ear, conjunctiva, cornea, mouth, gums, Schneiderian mucous membrane, ant. ⅔ of tongue, part of pharynx
Paralysis in	muscles of mastication, food not chewed on that side, fur on tongue of that side

Tendency to ulceration of mucous membrane.

Spongy gums, tendency to ulceration of nasal mucous membrane; hence smelling may be impaired.

Ulceration of cornea.

Pupil contracts after a short period of dilatation.

Hearing may be affected.

The behavior of the pupil may not be constant. Its contraction has been explained by trophic disturbance of the retina.

These lesions are important. I recall two cases in the same family; one, a young boy whom I treated for earache, which was finally relieved by having a carious molar tooth extracted; the other, an older sister, who had partial hemiplegia involving the face and arm on one side, and who recovered promptly after treat-

ment directed to one of the incisor teeth. The paralysis was produced of course from the lower nucleus in the cord, and the higher medulla centers. The dental students cannot study this nerve, its connections, and its reflexes, too closely, as its disorders from dental troubles will at times throw much light on affections not only of the head, but of remote portions of the body.

Treatment of Pulpless Teeth by Iodoform Fumes Under Pressure.

By C. V. VIGNES, D.D.S., New Orleans, La.

THE treatment of pulpless teeth with the fumes of iodoform under pressure had its origin and was first practiced in 1891 by Dr. John C. Blair, then demonstrator of operative dentistry at the Louisville College of Dentistry. It was used by himself and the students at college in over fifteen hundred cases during the time that I was there, and only two failures in obtaining the usual good results were recorded against it during that time.

Iodoform is sublimated at a temperature of about 240 degrees F.,—*i.e.*, it passes directly into vapor, which, upon cooling, condenses again into iodoform less a small percentage of iodin that is set free, and which, being a strong disinfectant and antiseptic and being also very penetrating when in its vapor state, especially so when under pressure, goes to every part of the tooth under treatment, even into the tubuli of the dentin, disinfecting and rendering perfectly aseptic every portion of the tooth with which it comes in contact; and the iodoform crystallizing against the walls of the root-canal up to the apical foramen, gives further assurance of asepsis.

To obtain the vapor and the pressure required to force it into the pulp-chamber and root-canal, Dr. Blair devised an instrument probably seen and used by many of those present.

It is very simple of construction, consisting only of a chamber to put the iodoform crystals and a rubber valve attached, to press the vapor when generated by heat through a needle-shaped tube into the diseased tooth.

For convenience, I have divided pulpless teeth under three heads:

1. Those containing a dead pulp that has given no trouble.
2. Those having a fistulous opening through the gums.
3. What is commonly known as blind abscess.

In the first heading mentioned, that containing an apparently harmless dead pulp, apply the rubber-dam, or use any other method to keep the tooth dry, then make an opening into the pulp-chamber just large enough to insert the point of the needle of this instrument, and after heating the iodoform chamber over the alcohol lamp until by slight pressure of the bulb a thin vapor is emitted, place the end of the needle in the opening of the tooth and by pressure on the bulb force the vapor into the pulp-chamber. Use the instrument for five or six seconds, open up your cavity, and you will find that the vapor has penetrated the pulp-chamber and root-canal.

Then you may clean out the canal, use the instrument again, and proceed to fill immediately and be sure of no after-trouble.

In teeth under heading No. 2, that is with a fistulous opening, use the instrument as before mentioned, and try to pass the vapor through the tooth out of the fistulous opening.

If you succeed in doing this (and you can in most cases) one treatment is enough, and you can go on and fill the tooth even if there is slight inflammation of the gums and surrounding tissues.

In cases which would come under my third division, that is where you suspect a blind abscess, the treatment is the same, but I would not advise immediate filling. Use some temporary stopping and have the patient return in two or three days, when you can treat again and fill at the same sitting.

Again, I will point two instances where the use of iodoform in this manner is very effective.

1. Where you fail after repeated attempts to remove all of the pulp from the root-canal, you can so desiccate and encase the remaining portion in iodoform as to render it inoffensive and make it form part of the root-filling.

2. You can fill with a solid deposit of iodoform the very small root-canals better in this manner than you can with any other material, and this done, you have an ideal root-filling—one that is together impermeable and antiseptic.

There is, however, one slight objection to this method of treatment, and that is the disagreeable odor of the burning iodoform. To obviate this, I used, at the suggestion of Dr. Montgomery, of Chicago, equal parts of ground coffee and iodoform, but found that while I destroyed in a marked manner the offensive odor, I failed to obtain the happy results that I had without the coffee. The fumes with the coffee become laden with carbon, lose their penetrating character, and cannot then be forced into the small root-canals, or even, after a time, through the needle of the vaporizer.

Now, in treating teeth in this manner, three rules should be followed:

1. Always keep the tooth under treatment in a perfectly dry condition.

2. Never attempt to pass a broach or any other instrument up the root-canal before first applying the vapor.

3. Don't use too much heat in generating the vapor, for this will liberate more iodin than is wanted, which will discolor the tooth and necessitate the use of hypersulfate of soda to remove the discoloration.

Thus it will be seen that in a few minutes you can accomplish with certainty what requires patience and sometimes several weeks of tedious work to do by any other method.

I know that the claims I make for this method of treatment are very broad, and that they seem too good to be true, but I have all faith in it. For nine years I have had unvarying success with it, and I am sure that if there are any other methods as good (and I doubt it) there are none better.

DISCUSSION.

Dr. H. W. Morgan: We have with us Dr. Chas. Essig, of Philadelphia. I hope we may hear from him on this subject.

Dr. Essig: I must ask to be excused, as I did not hear all of the paper and have nothing to say on the subject.

Dr. T. C. West: If the subject of the treatment of pulpless teeth is in order, I have something to say.

The Chair: The discussion should be confined to the topic of the paper,—the use of iodoform vapor in the treatment of pulpless teeth.

Dr. West: Six years ago I provided myself with a Blair vapor-

izer at the suggestion of Dr. Vignes, but I found that my patients had such very decided objections to the use of iodoform that I had to abandon that drug. I ask the consent of the Association to mention a different use I make of my vaporizer in the treatment of pulpless teeth. [Consent being given unanimously, Dr. West continued.] After experimenting with different agents, I have adopted the use of *acetanilid* in the vaporizer instead of iodoform. It is free from the objectionable odor, and has given beautiful results. It is a perfect deodorizer, and I have used it in the worst canals, and can fill them the same day. I have used acetanilid in this way for several years, with the most satisfactory results.

Dr. W. C. Barrett: I would like to know what special quality iodoform possesses that it can be regarded as infallible; that it will always give good results! I cannot conceive that any single remedy can be made to penetrate all the tissues. In the formation of pus in an alveolar abscess osteitis must certainly be the result, and that cannot be cured instantaneously. Hence I never fill immediately, no matter what remedy I may have used. Iodin is indubitably beneficial in many cases, but I wish the essayist would explain what there is in its therapeusis to produce such wonderful results. I deprecate these dogmatic affirmations backed up only by assertion.

Dr. Vignes: I believe it is the iodin that is set free in the tissues permeated by the vapor. I have not tried acetanilid, but I did try sulfur. I found, however, that I could not regulate the heat, and was in danger of setting everything on fire. I also tried camphophenique, but it quite destroys the value of the powder to vaporize it.

Microscopy, Histology, and Bacteriology.

Report by W. T. MARTIN, Chairman, Yazoo City, Miss.

Mr. President and Gentlemen: Hampered by environment, with the elements and equipments for scientific investigation lacking, the average practitioner can but accept the statement set forth by those who enter the field of research fully prepared for the work. Recent contributions to professional literature by eminent investigators on these lines of study are clear, comprehensive, and full of sufficient facts to render the conclusions arrived at plausible and worthy of special attention. Clinical evidence has led to the belief that some teeth are hard and some soft, supposed to be due to a lack of lime-salts; that the soft teeth were more susceptible to attack and more rapidly destroyed by caries than hard teeth. There was also established belief of structural weakness from degeneration, which might possibly be reached and strengthened through the nutritive function.

Dr. G. V. Black, in a series of clearly written articles, has given the profession valuable information on the physical characteristics of tooth-structure. He has shown by a very exhaustive series of experiment that there is no such difference in the per cent. of lime-salts in the teeth as had always been supposed. That the teeth of persons who suffer from caries are just as hard, just as heavy, and contain just as much lime-salts as the teeth of persons who do not suffer from caries. That both the denser and less dense teeth suffer from caries in about equal proportions.

Dr. J. Leon Williams, a number of years since, made the statement that "From the *a priori* standpoint physiological changes in completely formed enamel are impossible." At the close of his article on "Structural Changes in Human Enamel" he gives as his general conclusion that "all softening of enamel is due to the action of acids, and chiefly or wholly to the acids excreted by *bacteria in situ*."

The work of these gentlemen, as set forth by them, has not been received without much deliberation, as is evinced from discussion covering every point bearing on the subject by the following eminent investigators and forceful writers: Drs. Tomes, Andrews, Palmer, Truman, Maxfield, Bogue, and B. Holly Smith. The arguments by Drs. Williams and Black in support of their position are convincing that they have given a scientific solution of some obscure problem surrounding destruction of teeth by caries.

Yet there remain manifestations, from clinical observation, that are not clearly accounted for. Just why environment is unfavorable to bacterial activity in producing the acid to destroy the dense-looking yellow type of teeth possessed by some persons that remain immune from caries, notwithstanding entire disregard of cleanliness, through life extending over a long period of years, is not clear of mystery.

There will probably be stronger evidence given you by papers and demonstration of what has been and is being accomplished by scientific investigation in these branches, which are in reality the basis upon which the intelligent practice of the profession rests.

DISCUSSION.

Dr. Geo. B. Clement: I am not prepared to open the discussion of this report intelligently, as I had no opportunity of seeing the paper until after I reached this city, and I am so located, unfortunately, that I have not access to the recent literature on this subject. The essayist says very truly that the great majority of the dental profession are hampered by not having the necessary equipment with which to carry on such investigations. There is much, however, that is based on purely speculative theory, but the men who are making *bona fide* investigations along these lines have our sympathy, for they are looking for the truth. I accept the teachings of Black and Williams, that all teeth are alike subject to infection, but it is also true that they do not all suffer alike from the ravages of decay. The micro-organisms must find a lodgment at some weak point where they can get in their work of destruction. All teeth are alike susceptible to decay provided the micro-organisms are permitted to find lodgment and to remain undisturbed. But our duty in the premises is clear: they must not be permitted to remain undisturbed.

Dr. W. C. Barrett: I am very sorry that I was not here in time to hear all of the paper under discussion, as it is a subject which appeals most nearly to my sympathies. Your rules limit the speaker to ten minutes, but I could not get well started in that time.

The Chair: Your time will be extended.

Dr. W. C. Barrett: It is a subject that is not yet fully comprehended by the profession at large,—that is, what the bacterial theory of decay is.

Having made a pure culture from caries in the mouth, Miller inoculated a sound tooth outside of the mouth, under as nearly as possible the same conditions of heat, moisture, etc., and produced caries in a sound tooth identically the same in all its characteristics with that occurring in teeth in the human mouth. The evidence was indisputable. I am fortunate in having with me the original slides by which Miller proved this by incontrovertible evidence. I wish I had a lantern, that you might see them for yourselves. At the time Miller was making these investigations I was editor of the *Independent Practitioner*, and I published originally all of the papers in which he solved the problem of the ages. His theory has been so universally accepted that no dog now dare wag his tongue when Miller speaks. The investigations of Dr. J. L. Williams are of later date, and do not antagonize the position taken by Miller, but are based upon his discovery. This is true also of the work of Dr. G. V. Black. Microbes are not merely scavengers, but are absolutely the cause of the pathological condition known as caries. Did Miller teach this simply to dentists? No! To the medical world only? No! He was the apostle of truth to the whole world of science. Some of you do, and perhaps some do not, comprehend that the bacteria are truly vegetable,—as much so as a potato or a cabbage. Not of the same order, for they belong to the cryptogams, while the potatoes and cabbages are phanerogams. The latter grow in inorganic matter, sending down their rootlets into the earth and decomposing the minerals, appropriating a part of their elements into their own growth and leaving the rest to form new combinations. It is upon this theory that the firmly settled "rotation of crops" of the agriculturist is based. The rejected elements and their combinations of the growth of the potato may be inimical to the growth of one vegetable, while they are precisely adapted to that of another.

The fungi, which belong to the cryptogams, grow, or multiply, or proliferate in an analogous manner, except that it must be in organic matter. They decompose the elements of that in which they grow, building a part into themselves and setting free the others, which unite to form that which is the result of all vegetable growth,—by-products. The character of these by-products, which are neither an excretion nor a secretion, but simply a resulting product, depends upon the organism itself and what it shall have taken out of the menstruum. All the poisonous effects of the pathogenic organisms, all the chemical changes induced by the proliferation of the bacteria, are directly the results of the formation of these by-products. They may be acid, they may be alkaline, they may be gelatins, gases, alcohols, alkaloids, ptomaines, or toxins. Cholera is nothing more than the production of a toxin in the system through the growth of a comma bacillus. The bubonic plague, that in a single invasion has caused the death of 25,000,000 of people in Europe alone, is another such. The virulence of some of these toxins is almost beyond conception. About the most fatal of our vegetable phanerogam poisons is strychnia, the lethal dose for a rabbit being about gr. .1 (one-tenth). But of that produced through the growth of the bacillus of tetanus the lethal dose is gr. .00000001 (one-hundred-millionth of a grain). Who can conceive this virulence?

Miller's great discovery was that the bacteria absolutely produce the disease through their proliferation, and not that they are the scavengers, destroying and living only in the degenerate products of diseased action. He proved this by demonstrating that caries of teeth was simply the result of the chemical action of a by-product of the growth of a micro-organism. He made a pure culture of one acid-producing fungus which he found almost universally present in caries, and with this he inoculated a saliva solution out of the mouth in which a sound tooth was immersed. The result was an artificial caries that could not be distinguished from that produced in the mouth. This proved certain things:

First. That caries of the teeth is a chemical solution of the tooth-substance, and a process with which the vital forces have necessarily nothing whatever to do.

Second. That it is the effect of an acid-producing fungus, and that therefore it is a bacteriological disease.

Third. That the pathological action in zymotic disease is the direct result of the proliferation of micro-organisms, and that infection is the communicating of some specific bacterium.

Fourth. That the restoration of tooth-tissue lost through caries is purely mechanical, and that all prophylaxis must be based on antisepsis.

Fifth. That the so-called predisposition to caries must be mainly a question of environment, or of septic oral conditions, possibly modified by high resistive powers through a condition of tonicity or perfect vital structure.

The Miller theory of caries is then this: Amylaceous food lodges in sulci or between the teeth. By the diastatic action of the saliva it is converted into a form of sugar. This is infected by an acid-producing organism, which splits up the sugar and leaves as one of the by-products lactic acid, and in turn this dissolves out the calcic salts of the tooth, forming a hole or cavity. Many subsidiary questions enter into the question, but this is the essential truth of the solution of this problem of the ages by Miller. As I have already said, the studies of Williams, Black, Andrews, Truman, and others are but further elaborations of the basal truth first enunciated by Miller. They have elaborated the details of that which he discovered, and in the main simply confirmed the truth of his exhaustive observations.

Dr. Williams finds a felt-like capsule inclosing or holding in place the bacteria which produce these deleterious effects, but I cannot conceive that these are the true acid-forming microbes. The bacteria found in these felt-like layers may be leptothrix,—the thread-like forms,—but if so they are not acid-producing, and hence will not cause decay. It has been asserted that the bacteria, under altered conditions, may change from alkaline to acid-producers, but I cannot conceive this any more than I can that lions may be fed on cabbages until they will lie down with the lamb without the latter being inside them.

Some of Dr. Black's experiments are highly scientific in character, though this cannot be said of all his work. He asserts that there is not much difference in the composition of teeth, even of those we call soft, and which melt like snow under the summer sun, and those that are so dense and hard that we can hardly cut them; that there is the same proportionate quantity of calcic salts

in the one class as in the other, the difference being due to environment, and not inherent in the teeth. But this does not accord with our clinical experience. We daily encounter certain conditions which we interpret very differently from this dictum of science. Clinical experience cannot be depended upon when it is in direct opposition to scientific fact. The personal equation enters too much into the matter. Our judgment in personal experience is so liable to be warped by individual bias, and by preconceived opinion, that as positive testimony it is utterly unreliable. But it is valuable as subsidiary evidence, and the consensus of the opinion of a whole profession cannot be very much in the wrong.

Is Dr. Black then right? Not altogether. Is he wrong? Not altogether. Must we refuse to accept the verdict of our own experiences? Not altogether. There is a certain personal element which constitutes an integral factor in the problem, that dominates the whole thing. To-day we are well; to-morrow we may be ill; some of us may be readily infected by zymotic influences, while others may wade through pools of putridity and never know infection. Some are comparatively immune, others are not so fortunate. It is largely a question of immunity.

And yet chemistry can detect no difference in the bodies. So far as physical structure is concerned, the one may be as perfect as the other. What is the difference between the living and the dead body from the physical standpoint? The dead measures the same as when living. It weighs the same. It is chemically identical. The only variance is that function has ceased in the one. What is function? It is an organ or set of organs in action, as distinguished from them when at rest. Vitality is the result of proper functional activity, and that organ which is the result of vigorous and healthy function, which is the product or growth of organs that are entirely normal of themselves, can be in that state of tonicity which will successfully resist disease or pathogenic organisms. That enamel-organ which exercised its functions in an entirely healthy body, and under absolutely normal conditions, may produce a tissue that shall have perfect resistive power, and may possibly maintain its integrity under morbid environments. Hence the element of vitality is one of the factors in the summing up of the problem, and this element Black has eliminated. Therefore it is that his solution may not be the proper one, and clinical expe-

rience, unscientific and uncertain as it is, appears to be arrayed against him.

The possibilities of the proliferation of bacteria, if undisturbed and under none but favoring conditions, are inconceivable. Individually their size may be compared with man as about the same ratio of man and Mont Blanc. And yet it has been calculated that the product of one single bacterium, under none but favoring circumstances, might in four days fill all the multitudinous seas of the globe. The mind cannot comprehend it. The human mouth is a perfect breeding-place, offering all the most favorable conditions for proliferation in its heat, menstruum, and moisture. There are present in the mouth not only the bacteria which produce the lactic acid that causes decay of the teeth, but there are also multitudes of others, and many of them are pathogenic in their nature. Vitality—a tonic condition of the system—has much to do with the presence or absence of decay.

But you will say, if it is all due to the presence of bacteria, all that is necessary for immunity is to thoroughly sterilize the mouth. That is true; that is all that is necessary; it is an indisputable proposition. But, on the other hand, you cannot sterilize the mouth absolutely, and if you could the individual would die. For instance, there would be no perfect digestion of food without the presence of certain bacteria. I need not pursue this subject further. But we can sterilize to a certain extent, and by attaining a reasonable degree of asepsis keep the teeth in good condition.

When Miller first announced his great discovery I said, "Now all that is necessary to prevent decay is to keep the mouth sterilized," and I commenced using antiseptics in my practice. But after a year or so I could not discern any material change for the better. I persisted, and after a few years returns began to come in, the results of great perseverance in a few who acquired the habit of practical mouth-sterilization. I know of cases in which there appears to have been acquired almost an absolute immunity to decay. I have lost my business in those families.

To sum up. Miller made the discovery which solved the problem of the centuries. All the later investigators are working on the foundation laid by Miller. Williams, Mummery, valuable as is their work, could have done nothing except upon the basis of Miller's discovery. And yet I think they all make the common

mistake of excluding the vital principle as a factor in pathological degeneration.

Dr. J. Y. Crawford: I feel an unusual degree of embarrassment on this occasion, being called upon to follow a gentleman who has the ability to make a good argument whether on the right side or the wrong. It requires either temerity or audacity to attempt to take his place on this floor, especially as I cannot accept *in toto* his teachings. The gentleman referred to the experiments of Dr. Miller, and the dental caries which he produced in the laboratory in teeth outside of the mouth, caries exactly identical with that which occurs in teeth in the mouth. If Dr. Barrett is right, we have got to uproot the whole doctrine of heredity. With all due respect to Dr. Miller, I do not believe that caries produced in the laboratory, in teeth out of the mouth, can be identical with the process taking place in the mouth on living tissues. Think of the significance of the part that vitality plays in the etiology of dental caries. It is a chemico-vital process, as it was called in the literature of twenty years ago. It is a disease that affects horses as well as men, and we might learn a lesson from the modern veterinary dental surgeon in his practice of "floating" the teeth. That is a point which, if adopted in our practice, would prolong the usefulness of the natural teeth more than all these profound inquiries into causes. It has been said here that some teeth are softer and some teeth harder than others. I go farther than that, and say that there is hardly a tooth in the world that is not harder at some times than at others, different from what we found it a year before.

Dr. W. C. Barrett: Do you refer to a dead tooth or a living tooth?

Dr. J. Y. Crawford: I am speaking of the whole tooth, and a tooth is not a whole tooth unless the pulp is living, though the dentin may be nourished through the pericementum and not be a dead tooth, even though without a living pulp. But the changes of which I spoke occur only in a tooth with a living pulp.

What we want is a clear, reasonable explanation of the cause of simple decay; not senile degeneration, not erosion. Why does decay occur almost universally bilaterally? If you find a hole in the grinding-surface of a tooth on one side, why is it almost certain that you will find a similar hole in the same tooth on the other side? That the conditions on the right side will be the same as on the left?

Dr. W. C. Barrett: Bacteriology shows the reason.

Dr. J. Y. Crawford: I want to get hold of that kind of bacteriology. There may be something valuable in it, but great minds the world over are capable of making mistakes. I know very well that I lay myself open to the criticisms of the scientific world, but my conscience demands that I say what I think and believe.

Dr. L. M. Cowardin: The preceding remarks lead me to say that the main fact is that we have transgressed nature's great laws; we have departed from the right path; we have gone astray. And the question is, how are we to get back? Because we are in the wilderness (a wilderness of bacteria) are we to sit down and be eaten up, or burn ourselves up with germicides in a vain effort to destroy the bacteria? I say no. It is better for us to strive to live naturally, and thereby build up the greatest of all barriers to bacteria. I attribute to vitality all the emphasis that Dr. Crawford gives it, but there are occasions when this vital force fails to perform its functions in the most perfect manner. This is especially true in connection with the teeth, for in dental caries vital force fails to perform its function in the perfect formation of secretions which should prevent the existence of the fungi which so evidently cause dental caries. I hope it is not necessary to say any more here to give an idea of what my theory is. I do not say, however, stop fighting with germicides, antiseptics, etc.

Dr. Laurence Leonard: I do not propose to play to the galleries, as some have done. I have all scientific investigations at heart. I have dentistry at heart. We should speak very guardedly in discussing scientific subjects. Whoever has followed up the investigations of Miller, Williams, and Black feels like taking off his professional hat at the mention of these names. These men, who work through the long hours of the night for our benefit, will surely find their reward in the hereafter, and also in the manifested appreciation of those in the profession who have followed and comprehended their work, and who can appreciate what the microscope reveals. There is a practical side to all this which the busy, every-day dentist can put to advantage. Whether the teeth are what is called "hard" or "soft," by proper hygienic treatment they can be saved. Mr. President, allow me to say that in the last few years I have saved many teeth that but for the teachings of Williams and Black I should have deemed hopeless. If we can get

the mouth in a healthy condition, and if the patient will second our efforts with the proper use of the brush and floss and antiseptics, then we can fill the so-called "soft teeth" with justifiable anticipations of permanent good results, provided the cavities are properly cut and fillings properly contoured. And here I take off my hat to Marshall H. Webb. If they come to us past filling, a properly contoured crown will still save for many years of useful service roots which formerly would have been condemned to the forceps, or, worse still, left in the mouth to be the begetters of foul odors, disease germs, and inflamed gums, the latter which, on account of their soreness, prevent the patient from the proper, if not the attempted use of the brush, which leaves a condition that makes the conscientious dentist's heart ache.

In short, the practical point is, with good fillings and proper hygienic care, as Dr. Williams puts it, "the worst teeth will not decay."

Dr. Jas. S. Knapp: It has never been made clear to my mind that these organisms are the initial cause of decay; that they are ever found actually in advance of decay. There must be some defective spot to provide them with a habitat and to retain the *débris* upon which they are nourished. They may exist in the mouth, but they cannot cause decay unless conditions invite them.

Dr. Wm. Ernest Walker: I think if these gentlemen who apparently differ so radically would get together and talk the matter over as earnestly as Dr. Leonard would have them do, they would find that after all they do not differ. The trouble is, each one has in mind a different stage or phase of the process. Dr. Crawford is correct in saying that imperfect development constitutes an important factor in the decay of the teeth. Dr. Cowardin is also correct in saying that, as this imperfect development is due to an arrest of or imperfect nutrition at some period in the formation of the teeth, the defect is very naturally bilateral, and therefore decay is found to occur bilaterally. Why not? But this does not argue against the agency of bacteria in causing the decay. It is also true that the bacteria, though present in the mouth, do not attack sound, smooth, clean enamel. They must obtain lodgment in localities more or less inaccessible to the tongue, the brush, etc. And it is therefore in such localities that we find decay. Dr. Barrett is very vague. He has not told us what antiseptics he

prescribes, or how often or how to be used. I doubt that it is practicable to keep the mouth absolutely sterile by the use of chemic antiseptics and germicides. Friction, gently but persistently applied with a stiff brush, will do more to prevent dental caries than any other single agent. Decay has never yet been known to attack a perfect surface of enamel if kept smooth and polished. Dr. Cowardin does not say that his theory as to the agency of abnormal saliva is original, but I believe it is, as I have not been able to find any mention of it in our literature. It is well known that from various causes the saliva may become abnormal, may be deficient in normal alkalinity. The new idea is that ptyalin may be deficient so that the insoluble starch is not converted into soluble sugar. I am not a chemist myself; I have only been the dishwasher for those who have conducted the experiments, but, as I understand Dr. Cowardin's idea, it is that the starch, remaining gummed upon the teeth, affords a lodging place for the acid-producing bacteria and pabulum upon which they thrive. Through the experiments conducted by Dr. King and Professor Jones, of Richmond, we hope to discover something peculiar in the saliva in mouths in which what we call *rapid decay* is progressing.

Dr. Jas. S. Knapp: The great original cause of decay is what I have termed *inadequate dentilation.* In other words, the teeth are imperfectly organized, imperfect in structural qualities.

Dr. J. Y. Crawford: All this tends to overthrow the great doctrine of immunity. Many of us remember the time when we had only a few little old books on the care of the teeth; when the one idea as to the proper care of infants was that they should be fed in nature's way. Now we have adopted the idea that the child must be raised on artificial foods. It is all wrong.

We can secure immunity from decay, but it must be by local applications and local care and treatment. We must destroy the organisms which produce the toxins that produce the disease.

The Chair: Dr. Clement will now have an opportunity to close the discussion.

Dr. Clement: I will only say that I am glad that Dr. Martin's brief report has elicited such a discussion, and thank the gentlemen who have taken part in it.

"Absorption Areas" and Pulp-Nodules.

By SAMUEL P. COWARDIN, F.R.M.S., Richmond, Va.

DR. Wm. Ernest Walker, President Southern Branch National Dental Association: In reply to your request that I prepare for your Association a statement concerning the frequency with which I meet with "absorption areas" and "pulp-nodules," and to give anything of interest I may have bearing on the subject, will say that from what my books show I have sold nearly twenty-five hundred tooth sections since I commenced this work in 1893, and have given away over five hundred sections, including exchanges. This means that I have made approximately three thousand finished sections. I judge as an average I lose one-third in preparation after having cut the rough sections, like the tooth you have. Then I must have made forty-five hundred rough sections. Taking the usual run of teeth I get, and two teeth will make three sections, average of a number, so this means that I have inspected carefully not less than three thousand human teeth.

So far I have found three teeth containing large "absorption areas." Sections from two of these I have loaned Dr. W. M. Gray, of Washington, D. C., to photograph for the Army Medical Museum; the third you have in rough section. I will try to get the sections from Dr. Gray for you. In examining the tooth you have do not fail to notice on the outer surface of one piece a seeming plug of cement-like substance, which looks as if it fills the point from which the tooth was attacked. The other sections show attack from without the tooth, or rather the partly refilled absorption, and connects with the cementum and not with the pulp.

In these three cases some considerable part of the dentin is absorbed, but in quite a good many teeth, probably fifty or sixty

sections, I have seen very minute "absorption areas," and I have observed that whenever I cut the apex of an old tooth with a heavy coat of cementum, and where almost certainly there has been formed an abscess, I find more or less evidence of absorption, which areas are sometimes partly refilled.

The teeth I get are seldom in every way sound and normal, though very many of those that I use have no trouble showing on the tooth, and are probably extracted to put in sets of teeth. In these apparently normal teeth I find pulp-stones very common. I would say sixty-six per cent. show pulp-stones large enough not to be confounded with the dust from the saw. My observation leads me to believe that in fully-developed teeth, and certainly in old teeth, it will likely be found that it is rare that a pulp is *entirely* free from these nodules. They may be microscopic. Many attribute serious troubles to pulp-stones, but it seems to me that they must be so common that some stronger evidence than merely their presence is needed to show that they can or do cause the troubles attributed to them.

Formaldehyd in Dentistry.

By H. STUART MacLEAN, M.D.,

LECTURER ON BACTERIOLOGY, UNIVERSITY COLLEGE OF MEDICINE; BACTERIOLOGIST TO ST. LUKE'S AND VIRGINIA HOSPITALS, ETC., RICHMOND, VA.

THE few experiments which I wish to report to you to-day have been conducted with a view to determining definitely what has hitherto been surmised or taken for granted. These experiments are by no means complete, nor will they be limited to the efficacy of formaldehyd simply. During the coming year it is intended to carefully verify the conclusions in this paper at the dental infirmary, and at the same time take up the action of formaldehyd on the dental tissues, together with a series of systematic tests with other agents, to determine their action upon the teeth and their exact value as sterilizing agents.

The rôle of bacteria in the production of various diseases of the teeth is of course indisputable, and in dental pathology the classic researches of Miller rank with the studies of the greatest medical pathologists. The part played in the causation of caries, either by acid formation or by some other product, and the production of pulpitis, either by direct exposure or by bacterial infection through the dentinal tubules, is fully established; and here, as elsewhere in surgery, there remains simply the work of studying the various agents which may be used to counteract these untoward conditions.

Formaldehyd is a gas, of which the formula is CH_2O, made by

the oxidation of methyl alcohol. It is readily taken up by water, and is placed upon the market in the form of a forty per cent. aqueous solution, the most reliable of which is probably a proprietary article known as formalin. The forty per cent. solution has a pungent odor, and the concentrated vapor is irritating to mucous surfaces. Its efficacy as an antiseptic has been fully demonstrated, and it has found extensive use both as a local application in various diseases and as a disinfectant of rooms, clothing, hangings, etc.

It has been recommended in dentistry at various times, but always accompanied only by general observations as to its positive action. We would here call attention to the uselessness for all practical purposes of experiments which inform us that "such and such an antiseptic destroys or inhibits the growth of blank bacilli when used in a given strength." Inhibition of the growth simply means that when the restraining agent is removed the growth continues as before, and to say that the germs are destroyed and omit the time required to consummate this end is to omit a very essential detail.

With a view to determine some of these points we have taken up the following three subjects for investigation: Sterilization of instruments; sterilization of cavities; sterilization of root-canals.

STERILIZATION OF INSTRUMENTS.

Various instruments, burs, mirrors, excavators, and pluggers were taken, and into the crevices and serrations of some were plastered cultures of Staphylococcus pyogenes aureus and Bacillus typhosus; after which the inoculated portions were rolled in a paste of "tooth dust" and saliva. They were then placed in the incubator and dried, thus imitating as closely as possible the condition of an instrument after use and before cleansing. Others were dipped in thirty-six-hour bouillon cultures of the same bacteria, and dried in a similar manner.

The instruments were next immersed in a five per cent. solution of formalin, and at intervals indicated below placed in a tube of bouillon (if its size permitted), or cultures taken by scraping the instrument and stroke cultures made on agar-agar. Those prepared by the first method (see above) were rinsed in sterile water after removal from the formalin solution; the others were pressed lightly for a moment on sterilized filter paper.

	Results in 5 minutes.	10 minutes.	20 minutes.	30 minutes.
Staph. pyog. aureus.	Of five cultures two showed scanty growth; one in 60 hrs., one in 72 hrs.	Of four cultures, one showed scant growth in 5 days.	Sterile.	Sterile.
B. typhosus.	One tube of four showed quite abundant growth on 2d day.	One tube of four showed growth on 3d day.	One tube of eight showed growth on 3d day.*	Sterile.

Control experiments were made with all the tests. The variations quoted are in all probability due to the hardened condition of the material with which the instruments were plastered, as no agitation was used while exposing the instruments to the action of the antiseptic. While the ability to sterilize instruments by this process is demonstrated, during the investigation one objectionable feature arose (which we hope by future experiments to be able to counteract), *i.e.*, the marked tendency to the formation of rust upon instruments left in the solution over night (for eighteen hours or more). This fact also was verified by control tests made by placing similar instruments in sterilized water. It should be stated that we intentionally selected for these tests old instruments which were already roughened from previous usage and rusting; and these conditions may have favored oxidation, as a highly polished steel surface resists this action better than the variety used.

In connection with this method the following suggestions are made:

(a) The instruments used should always be cleansed (scrubbed) and the *débris* removed from the crevices, etc., at the end of the day's work. Aside from the fact that the sterilizing power of formalin is no reason for abandoning the ordinary methods of cleansing, it is not at all impossible that, as noted above, the caking of *débris* may be so hard as to resist the penetration of the antiseptic fluid.

(b) The instruments should be dried after cleansing and laid away until required again, not returned to the solution.

(c) A fresh solution is advisable every morning, or every other morning, unless precautions are taken to prevent evaporation. The cheapness of the solution renders this an inexpensive procedure.

*This tube grew as well and as rapidly as the control cultures. So marked a growth after so long an exposure suggests accidental contamination.

(d) The solution may be kept, while in use, in a shallow glass dish with perpendicular sides, having a loosely-fitting cover, such as this Petri dish which I show you.

STERILIZATION OF CAVITIES.

The use of so strong a solution as five per cent. for any length of time is not permissible on account of the pain which is liable to result; hence varying strengths were used, as detailed below.

Cavities in the molars were used, and some of the experiments were conducted in teeth *in situ,* while others were conducted in the bacteriological laboratory with extracted teeth.

The method in the first instance was as follows: The cavity was carefully cleared of all extraneous matter, decay, etc., and prepared as for filling; the tooth protected from the cheek and tongue by bibulous paper, and the cavity thoroughly dried with cotton. There was then introduced into the cavity on a platinum needle a small portion of some food particle removed from the cavity which had been soaked for a few minutes in a thirty-six-hour bouillon culture of the Staphylococcus pyogenes aureus or of Bacillus typhosus. This was smeared over the bottom and sides of the cavity, which was immediately filled with a small piece of cotton saturated in a five per cent. solution of formalin and left for five minutes; at the end of which time it was removed and cultures taken from the bottom and sides of the cavity. Then a one per cent. solution was replaced and the cavity sealed. At the end of twenty-four hours (some at twelve) the cavity was opened and cultures again taken from its surface. In experimenting with removed teeth practically the same technique was followed.

	5 minutes exposure to 5 per cent. formalin.		12 hours exposure to 1 per cent.	24 hours exposure to 1 per cent.
	Staphylo.	Bacillus.		
Vital.	Sterile.	One tube, out of two, showed a growth of non-motile bacilli on third day.	Sterile.	Sterile.
Dead.	2 in 16 yielded growth in 4 days.	Sterile.	Sterile.	Sterile.
Dead.	Not used.	One growth, faint, out of 3 tubes on 4th day.	2.5 per cent. for 15 min. Negative.	

From the foregoing it will be seen that sterilization takes place in the majority of instances after a five-minute exposure, while the twelve and twenty-four-hour treatment was uniformly successful.

With regard to sterilization of root-canals, it soon became evident during the investigations that there were obstacles which practically precluded the possibility of arriving at any accurate conclusion in the brief time allotted. Chief among these was the necessity for using so fine an instrument to pass to the bottom of the canal as to cast great doubt on the chances for obtaining a culture that would not be removed by the friction of the sterilized material at the top of the canal. Certain measures which have suggested themselves will probably enable us to carry this portion of the investigations to a more satisfactory conclusion. The method followed was practically that used in sterilizing cavities. In teeth *in situ* the cotton saturated in five per cent. formalin solution was placed directly over the exposed putrescent pulp. In using extracted teeth the canals were first cleaned out and then inoculated at the bottom with bacteria from one of the cultures used. On top of this were placed some food particles obtained from the mouth (pieces of bread saturated with saliva were used in some instances) and pressed firmly into the cavity and canal. The whole was then covered with the formalin solution, and the further steps were similar to those in cavity sterilization.

Cultures were obtained by means of a canal cleanser. The marked success obtained with one series, together with the almost uniform failure of all other series, pointed to some condition present which called for a radical change in the technique.

In view of the fact that in many respects sterilization of root-canals is the most important of the three subjects under discussion, on account of the danger of forcing infectious material through the apical foramen and thereby producing pericementitis, abscess, and even distant metastatic septic lesions, with which you are all familiar, we have planned a more thorough investigation with various antiseptics in the hope of arriving at some reliable conclusion.

DISCUSSION.

Dr. Wm. Ernest Walker: I like exactness wherever it is possible to be exact. We are continually reading recommendations of this antiseptic and that germicide as having all the qualities that

make it apparently just what we require, formaldehyd among others. It occurred to me that a series of experiments carefully conducted along certain lines might give us a definite basis upon which to reach conclusions as to the merits of the agent in question; its value to us in the sterilization of dentin and of root-canals; how long it requires to penetrate to the foramen, sterilizing the canal throughout, etc. If we know that in ten, twenty, or thirty minutes we can so sterilize a superior root-canal as to leave no liability of infecting the antrum, that absolute knowledge would be very satisfactory to us. We know that merely wiping out the canal with the germicide is no safeguard. If we knew that we could effectually sterilize our instruments by immersion for a certain length of time, that were less trouble than boiling for five minutes, as we now practice. We are told that this, that, or the other can be done; but we want the proof, and it was for the purpose of securing such proof that this series of experiments was instituted.

Dr. H. H. Johnson: The paper is a most excellent one and deserving commendation. We are greatly indebted to the essayist for making the experiments and coming here to give us the benefit of the results. But these experiments have been made with a drug which I consider too great an irritant to be used in a pulp-chamber or in a root-canal, as it is a powerful irritant, and there is a liability that it may penetrate the apical foramen and cause serious trouble. It is a most intense irritant. I speak from personal experience. A bottle of mouth-wash was left at my office by a traveling man. I took a little in my mouth, full strength, and I assure you I have never experienced such severe pain. It contained five per cent. formaldehyd, and from that little experiment I judge that a fifteen per cent. solution would be exceedingly dangerous; that it would cause extreme inflammation, and probably slough. Oil of cassia, beechwood creasote, or bichlorid of mercury 1-1000 are more potent than formaldehyd in the strength that we could use it, and free from its objectionable features.

Dr. Wm. Ernest Walker: If no one else has anything more to say, I ask permission to occupy the floor.

Consent being given, Dr. Walker said:

Dr. Wm. Ernest Walker: In regard to these experiments, it is but natural that I should desire to have their value appreciated, as they were made at my suggestion. I cannot, therefore, let the

remarks of the last speaker pass without comment. The professional method in discussing a paper is to confine remarks to the merits of the paper and to bring in as little extraneous matter as possible, and that only when necessary by way of illustration. Therefore I must say that it was hardly correct to exaggerate the irritating qualities of formaldehyd by reporting bad effects from having used it in a manner from which no rational person could expect good results, such as applying five per cent. to the mucous membrane. The discovery that five per cent. formaldehyd is irritating to the mucous membrane is by no means new. Any one with any acquaintance with the drug would anticipate that result from the application of even a one per cent. solution. But the application of formaldehyd to a carious cavity in a tooth, or in a putrescent pulp-canal, is an entirely different proposition, as is also its use for sterilizing instruments, or even its use in a mouth-bath, when employed in proper dilution.

Dr. H. H. Johnson: I ask permission of the gentleman who has the floor to explain. A traveling salesman had left at my office, among other things, a sample bottle of an antiseptic mouth-wash. I opened it and turned it up to my mouth. Finding it very hot, I looked at the formula and found that it contained five per cent. formaldehyd.

Dr. Walker: This explanation only makes it still less reasonable that this incident should be brought up as showing that it is not safe to use formaldehyd in the treatment of teeth. I have been using formaldehyd in my practice for over two years, but before beginning to use it I read all I could find on the subject, in order to employ it as intelligently as possible. I admit that its use has been largely empirical, for the reason that I have not known, in many instances, whether a weaker solution might not have had equally good results. Knowing that others have seen evidences of irritation from dressing root-canals with too concentrated solutions, I have been cautious, and as I have used it I have seen no deleterious effects, but have apparently seen good results. In the ordinary dressing of root-canals I use three per cent., but in case of large foramen only two per cent., while I have used six per cent. with very good results, when I had reason to believe the foramen was small and I desired to get prompt results. These various solutions I keep on hand ready for use. In the most modern text-

books, as Kirk's "Operative Dentistry," the sterilization of cavities is insisted upon. Dr. Burchard, in his "Pathology," emphasizes the importance of this, and highly recommends formaldehyd, but no definite statement is made as to how long the application should be made or what results are to be expected from solutions of different strength.

I have, in a number of instances, applied ten per cent. to the putrescent contents of a canal without any injurious effects. Of course, by the time this has permeated the mass of putrescent matter and reached the apical foramen, the strength is very materially reduced. In one very recent case I even used the forty per cent. full strength. I used it experimentally, and though the effects were very gratifying, it was undoubtedly risky, and I do not advise any one to try it. The patient presented with a lower molar containing a gold filling in an occlusal cavity, put in some years ago in New Orleans, under which the pulp had died. For two years the tooth had caused occasional spells of peridental tenderness and swelling extending slightly to the face. This was the first visit of the patient to me. The blueness of the tooth, together with its history, made the diagnosis very clear, and I could not see why the dentist who had been treating it for two years had not opened the tooth. It appeared to be a case of chronic so-called "blind abscess," with occasional exacerbations. There was no opening either through the tooth or through the soft tissues. Removal of the non-cohesive cylinder gold filling and the penetration of the roof of the pulp-chamber with a drill was followed by a welling up of pus and immediate relief from the pain, which on this occasion had continued for two days. The cavity was gently cleaned by several applications of three per cent. pyrozone. Then one end of a slender roll of absorbent cotton was saturated in forty per cent. formaldehyd and carried down into the pulp-chamber, the dry portion of the cotton loosely filling the occlusal cavity. The patient was under social obligation to attend "a dance" that evening, and I thought the chances were rather against a speedy recovery. As dancing drives the blood to the head, I feared he might experience renewed pain, and therefore I prescribed five-grain tablets ammonol to be taken for relief of pain. But he reported next morning that he had been perfectly comfortable, and had not had occasion to use the tablets. The treatment with

peroxid of hydrogen and forty per cent. formaldehyd was repeated, and again the evening of the same day, when the cavity was sealed with sandarac and the patient dismissed till the next morning. When he returned there was an entire absence of the infective inflammation and no evidence of irritation from the formaldehyd.

Dr. H. Stuart MacLean: I should consider over five per cent. formaldehyd entirely too strong for use in the teeth except in unusual conditions. There is, however, little danger of its escaping through the apical foramen; its coagulating properties would prevent that.

I said distinctly that in all our work in the mouth the tooth was very carefully isolated, in order to prevent any escape of the formaldehyd upon the soft parts.

Microscopic Illustrations of the Effects of Cataphoresis.

By Dr. A. F. SONNTAG, Waco, Texas.

TWO years ago it occurred to me that the only true and scientific method of investigating this subject would be by means of the microscope. I have prepared a number of microscopic slides to demonstrate cataphoresis, showing the effect on the tooth-substance by means of colored solutions. All of my experiments were made out of the mouth, from freshly extracted teeth, and under conditions resembling the natural condition of the mouth as closely as possible. In every instance the tooth was imbedded in moist sponge, only the crown remaining uncovered. The rubber-dam was adjusted to prevent any contact of the positive electrode with the sponge, the sponge connected with the negative pole, and the positive pole applied to the cavity. The solution used is a twenty per cent. solution of cocain colored with methyl violet. The strength of voltage used is the average that I am using on my patients in practice. I am able to show only the effect of cataphoresis on dentin at present, but in the future I hope to be able to also show you the effect it has on the pulp.

Now let us consider the tissue through which the electric current, carrying with it the solution and the substances it holds, has to pass to produce local anesthesia. Enamel is composed mostly of inorganic matter containing but little moisture, and by reason of its structure prevents the passage of the electric current and fluids through it.

Dentin, on the other hand, composed of seventy-two per cent. of inorganic and twenty-eight per cent. of organic matter, a homogeneous mass, penetrated by many parallel canals, filled by soft

homogeneous fibrils, having many fine branches and increasing in number toward the periphery of the dentin, gives but little resistance to the electric current. The current, carrying with it the solution, passes through the homogeneous fibrils in the dentin toward the pulp. Dry dentin will resist the current. A glass tube filled with powdered dry dentin, when inclosed in the circuit of the cataphoric apparatus, will resist all the current which the cells in the apparatus will produce.

Slide No. 1. A bicuspid, no decay, the cavity being made artificially. A pellet of cotton saturated in the cocain and methyl violet solution placed in the cavity and left in it for thirty minutes. None of the coloring fluid has penetrated the dentinal tubules.

Slide No. 2. Also a bicuspid, the cavity made artificially, a pellet of cotton saturated in the same solution, and the electric current applied fifteen minutes. The solution has not only penetrated the dentinal tubules, it has reached the pulp; but the coloring does not extend over all the surface of the cavity,—only a part of it is affected in large cavities. The current seems to pass through a sufficient number of canals required for its passage, and it seeks the shortest and most unobstructed route where it encounters the least resistance to reach the pulp. This demonstrates plainly that cataphoresis is of but little value in our work, unless we anesthetize the pulp, or, at least, the upper portion of it. Even in small cavities, where we can drive the solution into all the tubules that are exposed, if the solution does not reach the pulp all the tubules outside of this small circle will retain their sensitiveness. This accounts for the occasional failures we have. If we could confine our work to the small anesthetized circle it would be successful, but to make undercuts and to prepare the cavity properly we are invariably compelled to go outside of this circle. In larger cavities this will be more marked than in smaller ones, although in practical cases it seems generally the reverse; but this is easily accounted for. In large cavities the pulp is in closer proximity, and it is more easily reached by the current. Also decay of dentin plays an important part, as we will show directly.

Slides Nos. 3, 4, 5, 6 will show the same result.

Slide No. 7. Current and solution applied to normal dentin, and section made across the dentinal tubules, the coloring matter showing plainly in the tubules.

Slide No. 8. A root; the external surface ground away, and current and solution applied thirty minutes to the cementum; no penetration of coloring matter.

Slide No. 17. Now we come to consider cataphoresis in connection with carious teeth and the practical value in our every-day work. I have shown with the previous slides that normal dentin is easily penetrated by the electric current, carrying fluids and substances which it holds in solution to the pulp. But decayed dentin does not present the same facility to the current as does the normal. In caries the elements of the dentin are removed, producing first a softening of its structure, and as the process progresses further disintegration takes place until all the original structural elements are lost. The dentinal fibrils are the first to be attacked, the fibril substance destroyed, the lime-salts softened, leaving the dentinal canals filled with waste product. Here we have our minute conductors of the electric current destroyed, producing entirely changed conditions. Decayed dentin will not permit the current and fluids to pass through it readily; it offers too great a resistance by reason of its non-structural condition. By that I mean only dentin which has lost its structural form, not the deeper layers that have been affected by decay, but still retain the structural form.

Slide No. 9. A cavity to which current and solution was applied without removing the thick layer of decay, with the result that we have practically no penetration.

Slides Nos. 10, 11, and 12 give us the same results.

Slide No. 13. The superficial layer of decay removed before applying the current, and the result is that the penetration is complete at two points in the dentin and extends through it to the pulp-chamber. This is the typical result of successful anesthesia, and it shows us that we must remove the superficial layer of dentin, or part of it, at some point in the cavity.

Slide No. 14. To more fully demonstrate the resistance offered to the electric current by decay, I have prepared this slide. Before applying the current to the cavity, which contained a thick layer of decayed dentin, I exposed the healthy dentin at another point some distance from the cavity, the pellet of cotton with the solution covering both points, but the electrode placed only in the cavity. The result is that we have but little penetration of the coloring fluid in the cavity, but where the healthy dentin is ex-

posed the penetration is complete, although the distance between the cavity and the pulp is much less.

Slide No. 15. A cuspid; the enamel worn off of cutting-edge by mastication; current, and solution applied thirty minutes; no penetration of solution.

Slide No. 16. A similar tooth, but before using the current the superficial surface of the exposed dentin is cut away, thereby opening the dentinal tubules and giving more free access to the solution, with the result that the penetration is complete.

In conclusion, I wish to say a few words in regard to the solutions used in cataphoresis. The solution should always be only pure cocain. I notice in the dental journals that many use and advocate the use of solutions containing other ingredients to make it antiseptic, and to give it better conducting power. These solutions may work better, but I would be very much afraid of the result they might produce. If cocain in solution will penetrate and reach the pulp, the other ingredients will do so also, and while the cocain only produces local anesthesia, which passes off in a short time, any other ingredient contained in the solution might produce results disastrous to that delicate structure. My method in practice is to moisten a pellet of cotton, large enough to fill the cavity, in water, then dip it in pure cocain crystals and place it in the cavity. Only a few crystals are necessary to produce the desired result.

New Appliances and Improvements.

Report by Dr. T. M. ALLEN, Birmingham, Ala.,
Chairman of Committee.

DR. J. AUSTIN DUNN, of Chicago, exhibited a new cervical clamp, No. 2. This is a universal clamp, to be used for all cervical and buccal cavities. The two jaws are looped together, one sliding on the other, so that it can be made to fit any size tooth, from the smallest incisor to the largest molar. It opens wide enough to put a thick pad of bibulous paper over the lingual beak, which makes it painless to the patient and is controlled by a thumb-screw.

J. W. Ivory, of Philadelphia, exhibits a universal clamp. The labial jaw or front is controlled and forced up with a thumb-screw.

A sand-paper disk-carrier, invented by Dr. C. L. Alexander, and it is claimed for it that it will hold a disk perfectly tight while running in either direction.

A very unique crown-holder to hold crowns while polishing. Also a band gauge or mandrel for getting sizes of bands.

Messrs. Johnson & Johnson, of New Brunswick, N. J., exhibit several antiseptic articles,—antiseptic napkins, cotton rolls, cottonoid, salivoid pads for placing over the salivary ducts to check the flow of saliva, antiseptic dental floss, etc.

The S. S. White Dental Mfg. Co. exhibit an improved fountain spittoon called a Spiral Flush. It claims all the advantages of a rotating inner bowl without any machinery, and it can be cleaned easily and kept in a sanitary condition at all times, and can be brought directly in front of the patient, and can be entirely removed out of the way of the assistant or out of sight of patient.

Bowl is placed on an arm and removed from over the waste-pipe, and lessens the danger of gases escaping through the bowl.

Also a new engine or mechanical mallet, No. 3. This mallet is similar to the Bonwill engine mallet, but the improvements are that it can be made to strike a continuous blow like the electric mallet, and by a simple adjustment can be made to strike a blow as wanted by pressure on the point, and the hammer or lug is made to rotate and thereby causes an even wear to all parts.

Also Gillett's Little Giant separator, a new feature in separators, and many advantages are claimed for it. See description in February *Dental Cosmos.*

Set of Harlan scalers, which has many good features.

Dr. Gordon White exhibited two scalers for removing calcareous deposits from the teeth beneath the gums.

The following firms and manufacturers make exhibits:

Consolidated Dental Mfg. Co.

Dental Protective Supply Co.

A. C. Clarke, Chicago.

The S. S. White Dental Mfg. Co.

The Ritter Dental Mfg. Co.

John T. Milliken & Co., pasteurine.

W. V-B. Ames, Chicago, various cements.

Novelty Electrical Co., New York, Geo. A. Boehn, agent, exhibit an "Ever Ready" electric surgical and dental mouth lamp.

Report of Clinics.

(The clinics were preceded by a microscopic exhibit given by Drs. L. M. Cowardin and H. Stuart MacLean, consisting of numerous slides representing normal dental tissues and pathologic conditions of the teeth, together with slides of general histologic and pathologic tissues, and bacteriologic preparations. These slides were prepared by Samuel Cowardin, F.R.M.S., and Dr. H. Stuart MacLean, of Richmond, Va.)

CLINIC No. 1.

By T. C. WEST, Natchez, Miss.

Showing his Method of Working Vulcanite.

AFTER obtaining a good model in plaster, coat same with rubber cement,—amber cement made by the Chase Combination Co., is best. Take a piece of any good vulcanizable rubber large enough to cover model, and with thumb and finger press onto same until it is in perfect contact, the rubber cement holding it very firmly. If a very thin plate is desired, with the rugæ reproduced, cut the rubber so that it can be stretched crosswise, and it can be made as thin as desired.

After trimming off surplus from around rim, put in flask, pour in plaster until full, put on top, and when hard screw on jacket and vulcanize just enough to stiffen, first testing vulcanizer to see how long it will take.

This gives a vulcanite base-plate that will fit the mouth like a kid glove. (See Fig. 1.) After trimming up to accommodate muscles, get bite with it in usual way. If it is hard to get, let patient keep plate in for considerable time, and after getting used to it they will bite much better.

Having obtained bite, run model in base-plate, or it is better to

take an impression of first model in modelling compound before putting on rubber.

Make from this a model, and lay aside to use for articulator. If this has been done put base-plate on model and in articulator, pull off wax and cleanse surface perfectly, then all is ready to arrange teeth.

Fig. 1.

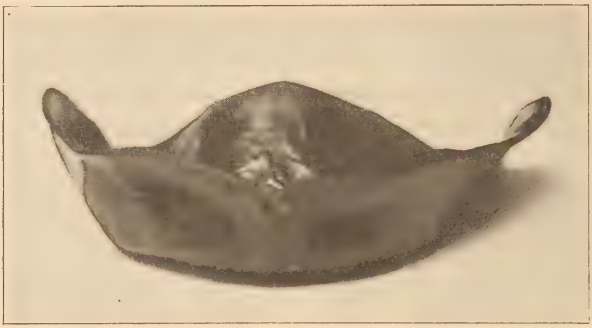


Fig. 2.

Coat surface of base-plate around ridge with rubber cement, and soften narrow piece of vulcanizable gutta-percha made by Doherty; press on to ridge where you desire to set teeth, building up wherever needed. Set teeth in this as in wax or any other material, warming each tooth as it is put on. After teeth are arranged, put small quantity of vulcanizable gutta-percha below joint, using warm instruments to pack same, and it is then ready to try in mouth. (See Fig. 2.)

If any changes are needed in arrangement of teeth, make them at chair by warming and replacing while plate is in mouth. This having been accomplished, take plate back to articulator, and after smoothing up around teeth with warm instrument, giving the desired shape and contour to gums, adding when necessary vulcanizable gutta-percha or plain rubber, take off each tooth in regular order, and there will remain a hard, deep impression of each tooth in vulcanizable gutta-percha. This will be a guide when the teeth are to be replaced. (See Fig. 3.)

Next take strip of thin pink rubber wide enough to cover from where pins will come to top of rim, and after coating this surface of plate with cement, gently press on pink rubber, being careful

Fig. 3.

to press as far into impressions of teeth as possible, so that they will show through pink. Replace teeth by warming each one and forcing it into its proper place, and there will be as perfect gum-tissue as it is possible to make with vulcanite, with no trimming around teeth to be done.

Next pack vulcanizable gutta-percha or plain rubber around pins with warm instrument until desired fullness is obtained, making it as smooth as possible, and all is now ready for final flasking.

This is done by taking plate off model, running plaster model in same; then put in shallow half of flask, put on rim, fill with plaster, put on top and jacket, and when hard vulcanize as usual.

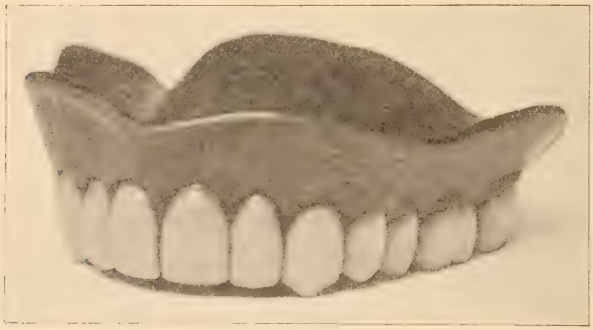
If tin foil No. 20 has been used everywhere but on gums, the plate will, with very little work, be ready for mouth. Do not

scrape gums; use brush wheel and pumice; then pumice with finger, and polish with plaster and a little oil with hand.

Plate when finished is represented in Fig. 4.

If full upper and lower plates are being made, remove one set at a time, put on pink as described. After replacing teeth in pink, then proceed with the other.

Fig. 4.



No attempt is made to give any of the smaller points or advantages of this method, as too much space would be required, but to those who may wish to give it a trial suggestions and further explanations will be cheerfully given.

CLINIC No. 2.

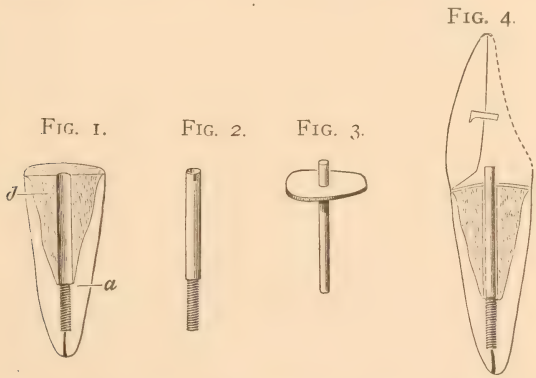
Method of Strengthening Decayed Roots for Crowning.

By H. H. JOHNSON, D.D.S.

Where the root of a tooth is badly decayed and the original canal so much enlarged as to render it almost impossible to firmly cement a post crown, such roots may be greatly strengthened and rendered useful by the following method:

Up toward the apical end of such roots there is generally remaining a sound portion which has not been enlarged by decay, as is shown by reference to Fig. 1, *a*. After having removed all disintegrated dentin in the other portion of the root, the canal in this sound portion is enlarged to as great a depth as possible for the reception of a threaded end firmly soldered to a platinum tube. (Fig. 2.) This tube is made by soldering a round wire into its end

the exact size and length of the enlarged canal in the sound portion of the tooth, upon which threads are afterward cut. The root is now tapped by screwing this threaded end into it with a firm, steady pressure. For this purpose a slot may be cut in the open end of the tube for the reception of a screw-driver. The tube is now removed by unscrewing it and the threaded end covered with soft oxyphosphate cement, and again screwed firmly into place.



(Fig. 1.) The outer surface is slightly oiled to prevent amalgamation and the space around it filled with amalgam, firmly packing in with a small-end instrument (Fig. 1, *d.*) The root now being restored to its former strength, the construction of a crown becomes a simple matter. The style usually recommended is the post and disk method, as shown in Figs. 3 and 4.

It will be plainly seen that after the post of the crown is firmly cemented into this platinum tube, which itself has been firmly anchored by being screwed into the sound dentin, a foundation will have been obtained which must have all the strength required.

CLINIC No. 3.

Construction of Porcelain Crowns, Rubber Vacuum Plates, and other Original Ideas.

By C. L. ALEXANDER, D.D.S.

Dr. C. L. Alexander, of Charlotte, N. C., exhibited models and drawings showing a number of original ideas, special mention

being made of his method of constructing hygienic porcelain crowns. An illustrated description of this and other methods will be found in the clinical report of the union meeting of the Maryland, Virginia, and Washington City Dental Associations, published in the March number of the *Dental Cosmos,* 1899.

Dr. Alexander also described his method of making a rubber vacuum plate which assures success in difficult cases. The plate is in no way different from the ordinary vulcanite plate, with the exception that it is provided with a flexible rim extending across the heel and entirely around the rim of the plate. This flexible rim adjusts itself to the soft parts of the mouth with which it comes in contact when the plate is in use, thus making a most excellent vacuum chamber of the entire palatal or base surface.

This flexible rim is made by allowing the plaster to extend well up on the rim and over the heel of the wax plate when investing. When the wax is removed this protected portion of the rim and heel is packed with Doherty's flexible rubber, and the other part of the work is packed with any good vulcanite rubber. The case is vulcanized at the same temperature and time allowed for hard rubber work. A plate made in this manner will have a flexible rim which will not require any finish whatever, as the excess of rubber is forced above the point of union of the flexible and hard rubber. By using tin foil as a lining a smoother finish is secured.

CLINIC No. 4.

Demonstrating the Removal of Septa and Alveolar Walls Previous to the Insertion of Artificial Teeth.

By Dr. GEO. B. CLEMENT, Macon, Miss.

The forceps used was the "Alveoli Amputating Forceps," the invention of Dr. Clement.

After the extraction of one or more teeth and preparatory to the insertion of artificial dentures, the forceps are used to cut off and trim to a smooth surface the projecting alveolar process, made prominent by the intervening septa and the lingual and labial walls of the socket. The surgical operation performed with the alveoli amputating forceps should follow immediately after the extraction of the tooth, or teeth, and may be finished in from one to two

minutes (frequently in less time) and with very little or no pain, as the shock produced by the extraction paralyzes to a great extent the few nerve-filaments passing into the alveoli.

To perform the operation, first pass the instrument into the socket and remove the septum as far down as deemed necessary. After the septum between each tooth, or roots of teeth extracted, has been removed, the long, flat beak is to be placed on the margin of the outer surface of either the lingual or labial plate of alveolar wall (as the case may be), and slowly, yet firmly, pressed down between the alveolar wall and the periosteum of same, as far as deemed necessary, being careful to save all soft tissue and especially the periosteum. I call especial attention to this feature of the operation from the simple fact that this is the reconstructive osseous forming tissue, playing an important part in the healing process. After the flat beak is passed down as above directed, the concave or cutting beak is now closed down from within the socket and the alveolar wall smoothly cut off as necessity demands. The walls of each socket from which the teeth have been extracted are to be trimmed likewise as the case may demand. After the trimming process the parts are to be washed with any antiseptic wash, and the gum is ready to heal, which will only take from two to three weeks. The gum flaps may be brought together by ligatures, using a curved needle, making the stitches three-quarter inches apart, being sure to pass the needle in over the septum space, and not the socket space, to insure perfect drainage.

While I have found the ligatures very important in some few cases, in the large majority of cases I stop the operation after washing out with an antiseptic wash. I use this formula:

℞—Carbolic acid,
Oil cloves, āā 1 dr.;
Glycerin, 2 oz.;
Distilled water, ad 6 oz.
Sig.—Antiseptic mouth-wash. Shake well.

Some two years ago I was forced to the conclusion that the extraction of teeth as performed by the dental surgeon of to-day was not a complete operation, and that much subsequent suffering to patient and intervening time from date of extraction and insertion of the permanent set of teeth could and should be saved by a more thorough and scientific preparation of the alveolar ridge. I at

once began to experiment, and from actual demonstrations have conclusively proven beyond doubt that I am correct. While I appreciate the importance of a prominent ridge in many cases, yet I claim all need more or less trimming, and experience has proved that the operation as suggested will in the end lessen the ultimate absorption instead of increasing it by the surgical interference. All absorption is due more or less to inflammatory action set up by constitutional disturbances, or local irritation prior to the extraction of the teeth. Subsequent to the extraction of the teeth the absorption is due wholly to the inflammatory action set up by the simple operation of extraction. Now note this point. The ragged or jagged surface as left without the trimming or surgical interference prolongs this inflammatory action and brings about the very condition which has a tendency to produce absorption. My operation proposes to do, by legitimate surgical method, in a few minutes' time, with little or no pain, what it would take nature otherwise months to do, and by this operation we save the patient much pain, soreness, and discomfort for so long a time.

Again, in prominent arches, especially around and about the canine eminence and incisive fossa, a little trimming immediately after the extraction of the teeth, as above proposed, with the alveoli amputating forceps will save much trouble and worry to the operator when the time comes to adjust the permanent set of teeth. In cases of abnormal protrusion, even to deformity, the forceps and operation will restore the contour, and the insertion of either gum or plain teeth will be made easy and a matter for choice. The surgical method, as above set forth, will prevent that peculiar tension just over and opposite each septum, always present after the extraction of a number of teeth, to worry both patient and operator.

The forceps may also be put to other uses. In the extraction of roots the flat beak may be used as a universal elevator by spreading wide the handles and passing the point in as any other universal elevator. For the extraction of roots broken down on one side pass the flat beak in between the gum and alveolar wall, or between the alveolus and root, close in with the concave beak, and the root may be easily extracted. In cases where the root hangs to the socket pass flat beak in and mallet up until the separation of wall and root takes place, then remove root in usual way.

In conclusion, I claim the forceps will—

Trim any and all parts of the alveolar wall from tuberosity to tuberosity above and from ramus to ramus below.

It will lessen the pain, soreness, and discomfort to patient.

It will shorten the time from extraction to insertion from two to six months, and get better results.

It will prepare the alveolar ridge just as you desire it, removing all prominences and making a smooth, solid surface upon which to mount the teeth.

[The patient, in this clinic, was a lady of perhaps twenty-five years of age, whose teeth had evidently received little or no care. The mouth having been carefully examined, it was considered advisable to leave a clean upper jaw. Four badly decayed teeth and the broken-down roots of ten others were rapidly removed, and the ridge immediately smoothed down as described.]

DISCUSSION.

Dr. J. Rollo Knapp: The gentleman said that he removed all of the alveolar process. I take exception to that statement; he only removed the septa.

Dr. Clement: I removed the septa and socket walls, and as much of the alveolar plates as was necessary to leave a rounded surface such as nature takes weeks, and sometimes months, to produce by the slow process of absorption, but with which nature does not always stop.

Dr. Knapp: Even granting that the gentleman removed all of the outer plate of the alveolar process, I take exception to the statement that the gingival tissue will come over and reunite. I think the patient has been subjected to undue suffering, and that the final results will not be found to justify the operation; the mouth will not be ready for a permanent plate in four weeks, as the gentleman claims.

Dr. Clement: I claim that the gums will heal in a few weeks, and that the time of waiting for the insertion of teeth will be shortened from two to four or six months.

Dr. T. P. Hinman: I move that the President appoint a committee of local dentists to look after this case, watch the results, and report upon it.

Dr. Jewett: I move to amend that motion by inserting that their report be embodied in the proceedings of this meeting.

[Resolution as amended adopted.]

Dr. Hinman: I now move you that the committee be appointed at once, that they may make an immediate examination as to present conditions.

Adopted.

The Chair appointed on the committee, Dr. J. Rollo Knapp, Dr. C. V. Vignes, and Dr. Joseph Bauer.

Dr. J. Y. Crawford: I ask unanimous consent to make a few remarks, in order that the further investigation of this case may be conducted aright. A large per cent. of us believe in the immortality of the soul. Many of us believe that the souls of the departed are looking down upon us, cognizant of what we are doing. I imagine among them one of the most eminent dental surgeons that ever lived on this earth,—the great Wm. H. Atkinson. He laid down as one of the fundamental operations in oral surgery the one which we have witnessed in this clinic. That operation, if properly done, is based upon the profoundest principles of oral surgery. It is worth more in a practical sense than all the clinics in oral surgery that I have ever seen.

The grand old Atkinson laid down as the first principle in the preparation of a mouth for the reception of artificial teeth the immediate surgical removal of all that nature would otherwise remove by a tedious and painful process. When the teeth have been removed, the alveolar process is no longer needed, and nature removes it by the slow process of absorption. Dr. Atkinson taught us to anticipate the tedious process of absorption and remove at once, surgically, what nature unaided would take a long time to accomplish. When it is necessary to remove a number of broken-down teeth and buried roots, the jagged margins of the alveolar process and the numerous septa cause suffering, prolonged sometimes for weeks and months, as the scar tissue of the healing soft tissues is drawn taut across the projecting points of bone. It is a humane operation to present, by means of a surgical operation such as we have witnessed, to the torn and mangled gums a smoothly-trimmed, rounded surface, over which they heal rapidly by first intention. I am enthusiastic in what I believe to be right, and I apologize to the gentlemen from whom I differ so radically in regard to this operation.

Dr. Clement: I ask the privilege of the floor to say that if this lady were a private patient of mine, I should have the privilege of

seeing her from time to time, and I now ask the privilege of seeing her again, as my patient, that I may watch this mouth, which is to be under the critical supervision of your committee. If this was an office patient, I should expect to see her after two or three days; I therefore ask that she be brought here again on Monday, to be examined by your committee and by me. (This was assented to.)

Dr. J. R. Knapp: I ask the privilege of the floor, that I may publicly disclaim any thought of discourtesy to the clinician, but I consider that nature has been outraged. The gentleman claims that there is but little if any suffering in the removal of the process after the extraction of the teeth; you who have witnessed the operation are the judges of that. As chairman of your committee I will say that a report will be presented upon the various points involved; we will also take casts of the mouth at different stages, and when the mouth is ready I will take pleasure in making a plate for the lady.

[A partial report was subsequently made, per Dr. C. V. Vignes, as follows:

New Orleans, La., March 31, 1899.

The Chairman of the Committee states that it is impossible to make more than a partial report in time for publication with the proceedings of the meeting.

What can now be said is that the operation of Dr. Clement seems to be a success, and it is only where he failed to remove all of the septum and outer wall that there is soreness and inflammation.

(Signed) C. V. Vignes.]

CLINIC No. 5.

Use of Dental Helix.

By Dr. A. J. FORET.

My clinic was dental helix for obtunding sensitive dentin. Its virtues were successfully demonstrated on patient before the society. No illustrations. I remain

Most respectfully yours,

A. J. Foret, D.D.S.

CLINIC No. 6.

By Dr. LAURENCE LEONARD.

Demonstrating the Manner of Preparing and Measuring Approximo-Occlusal Cavities in Bicuspids and Molars.

(Performed by Dr. Laurence Leonard, of Waseca, Minn., and reported by Dr. L. A. Smith, of Port Gibson, Miss., who was also the patient.)

Fig. 3.

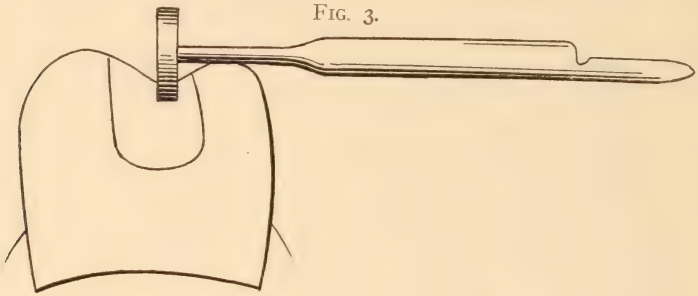


Fig. 4.

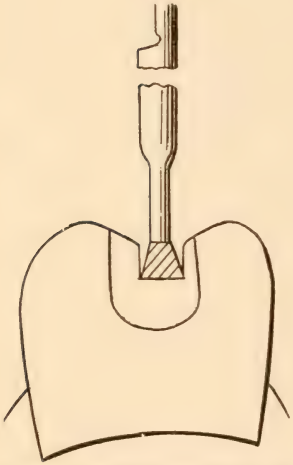
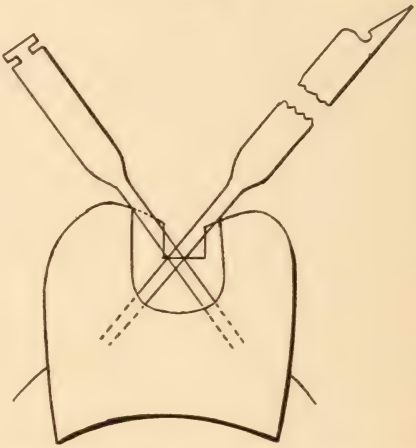


Fig. 5.



Cavity, mesio-occlusal, first right superior bicuspid. Removed frail walls by means of chisel having large octagonal shank and transverse serrations extending to very near the cutting blade of the chisel, thus giving a maximum amount of friction and preventing the instrument from rotating or sliding between the fingers.

The remaining occlusal enamel was removed by grinding with small corundum wheel (Fig. 3). The floor of the step was then

cut with an inverted cone—the only place where Dr. Leonard uses the inverted cone. (Fig. 4.)

The cavity was extended gingivally by first piercing with a spear drill to the desired depth of the bucco-cervico-axial and linguo-cervico-axial angles (Fig. 5). Into the bottom of these two holes formed by the drill was placed a round bur of the same gauge and the cervical dentin removed, at the same time forming approximately the cervico-axial angle.

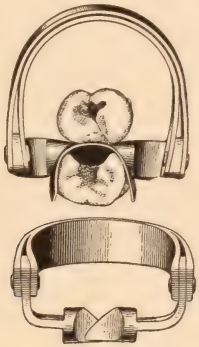
The unsupported cervical enamel was then easily broken down and the floor of the main cavity formed by chisels.

MEASUREMENTS.

Width of the tooth bucco-lingually	10	millimeters.
*Width of the cavity	4.5	"
Width of the cavity seat bucco-lingually	4.5	"
Breadth of cavity seat mesio-distally	1.2	"
Length of step mesio-distally	2.8	"
Width of step, maximum	2.5	"
Width of step, minimum	1.6	"
Depth of step	3	"

Matrix was then applied and held in place by Leonard's matrix holder (Fig. 9) and cavity filled.

FIG. 9.



DR. L. A. SMITH: I was very apprehensive of pain, and endeavored, but in vain, to obtain vapocaine. But through the clinician's method, together with delicateness of touch, accurate instrumentation, and deep inhalations on the part of the patient, the operation was practically painless.

*On account of this cavity approximating a sharply angled cuspid, its width was made unusually narrow.

CLINIC No. 7.

Correction of Irregularities.

By Dr. W. J. YOUNGER.

We have here a case of irregularity which can be easily and quickly corrected by the simple use of silk ligatures. But we have first to consider the relation of these incisors to those of the upper jaw. We find that the inferior left central is slightly beyond the line of the arch which we wish to establish, while the corresponding lateral and the right central and lateral are very much within. We find that the cuspids which are to form the imposts of the arch are in proper position, but the space between these imposts is too small to permit the incisors to take their proper place in line. We shall therefore have to reduce the size of these teeth laterally, as well as the approximal surfaces of the cuspids. You will observe that the lateral surfaces of the incisors have undergone deterioration, and it will be a positive benefit to them to have this disorganized surface removed, and thus abort a decay that would surely take place but for this procedure. You will find that when this is effected there will be sufficient space to bring the teeth forward into line.

We will now take double oo thread and wax it; the object of waxing the thread is to increase its textile strength. It does so by uniting the minute fibers on the sides of the filament. Besides, waxing it makes the thread and the knots more easily handled. We will now double the thread to get more strength, and, placing it in front of and across the two right bicuspids, wind each thread around each tooth, bringing both filatures out through their interspace. We have now the resistance of these two bicuspids for anchorage. Now we pass one of these threads over the cuspid and around to the rear of the lateral, while the other is brought straight across, involving it in a loop. Now pull easily, steadily, and firmly upon both threads until they are stretched to their utmost tension, and make a surgeon's knot over the cuspid; then place the end of the ring finger (third finger of the left hand, which, by the by, you will have to educate for this purpose) tightly on the knot to keep it from slipping, and with the other fingers make a granny knot (single knot), and without relaxing in the least the pressure on the surgeon's knot draw the granny knot tightly over it. Now I remove my finger and take the free portions of the thread, one in

each hand, and by gentle but firm strain work the knots so as to further increase the tension of the thread around the teeth, for by this time the lateral has yielded slightly to the pressure.

I discovered some years ago that a thread could be further tightened under a surgeon's by a granny knot without the knot yielding back any of the gain. Now I shall put another surgeon's or double knot to make the tie doubly sure. There is a popular fallacy extant that silk thread, in common with other threads, tightens with moisture, but this is a mistake, for moisture does not contract silk.

To-morrow or the day after, these ligatures should be removed, and a similar ligature from the same anchorage passed over the right lateral and around the central. A similarly attached thread will now be placed on the left side to move the left lateral into the arch. In the course of a week, ordinarily, these teeth will be well loosened and ready for the second stage. This will consist in casting away all the old threads and relieving the bicuspids for a while at least from further duty as anchorages. The cuspids will now serve as hitching-posts. A doubled double oo thread will be passed round the left cuspid, for instance; carried back of the lateral, then around over the front of the projecting central and back of the right central and lateral. The threads will now be divided so as to clasp the right cuspid, and, after producing the necessary tension, tied as in the former manner. This pressure will force the incisors in retreat forward and force back the projecting tooth.

If in this case it were necessary to advance all the incisors, or to bring them forward to the arch line established by the left central, then that central should be first thrown forward, in order to unlock the incisors behind it and enable them to be brought more easily to the front.

If at any time you wish to apply the ligatures for the purpose of rotating a tooth, you must remember that the portion of thread that forms the noose to grip the tooth *must not be waxed,* for if it is waxed it will slip its hold. Therefore, take a thread fourteen or sixteen inches in length, double it so that the ends will meet exactly. Now grasp about half an inch of the folded end with your thumb and forefinger tightly, and wax from these fingers to the free ends. Now put a double noose around the tooth to be rotated, and bring the ends together at a tension so as to be sure it is the unwaxed

portion of the thread that is in immediate contact with the tooth and make your ties,—first a surgeon's, and then a granny knot. These should be drawn as tightly as possible to perfect the grip. Now make another granny knot, but not so tight, in order to break the strain from the other knots. Now coil your threads two or three times around the root in the direction the tooth is to be rotated; draw them by stretching the thread until it will yield no more, and make your fastening. Remember that it is the contractility of the thread when extended that gives it its wonderful power.

CLINIC No. 8.

The Jenkins System of Porcelain Inlays.

By T. P. HINMAN, D.D.S.

Dr. T. P. Hinman, of Atlanta, Ga., made a porcelain inlay by the Jenkins system. Case, labial surface of right superior central. The shade of the tooth is first selected before the adjustment of the rubber-dam, for the reason that after the rubber-dam is adjusted the tooth changes color on account of the drying out of the moisture. The cavity is then cut with perfectly parallel walls by means of an inlay bur, care being taken that the edges are perfectly square. No. 20 rolled gold is next introduced into the cavity, being pressed closely on the walls with cotton pellets. After this matrix has been carefully removed from the cavity it is invested in powdered asbestos and water, which is held in a small platinum cup made for the purpose. When the water of the investment has been dried out, the matrix is filled with an inlay body mixed with absolute alcohol. The material is now placed in a specially designed furnace and carefully fused. As a rule it requires two bakings to make a full inlay. After the inlay is cool the gold foil is stripped from it and the inlay fitted in the cavity; thin cement is smeared in the bottom and sides of the cavity, and the inlay pressed home with a piece of wood. If the inlay seems too high, it can be ground to the surface and polished with a cuttle-fish disk.

Hygiene.

By Dr. J. PERCELL CORLEY,

ECTURER ON MEDICAL DENTISTRY, MEDICAL DEPARTMENT UNIVERSITY OF THE SOUTH.

"Talk health. The dreary, never-changing tale
Of fatal maladies is worn and stale.
You cannot charm, nor interest, nor please,
By harping on that minor chord, disease.
Say you are well, or, all is well with you,
And God shall hear your words, and make them true."

PHILOSOPHERS claim that somewhere on "this sorrowful bad earth," in the perfumed petals of her botanic gardens, or the boundless wealth of her mineral store, there is a specific for every disease. Be that as it may, we speak to-day of a greater boon. Hygeia, the most beautiful and attractive of all the daughters of the gods, extends the scepter of immunity to all who intelligently seek her.

I invite you to discuss with me whether immunity from dental caries can best be accomplished through local or systemic measures. This question implies that immunity is a reward to hygiene. An intelligent discussion of this question involves another and a very important one, which we shall touch upon, hoping that I shall not trespass the limits of my subject. Is dental caries of local or systemic origin? If entirely local, then our domain is restricted entirely to the mouth, and we can never hope to be more than therapeutists; if, on the other hand, it is due solely to systemic pathology, we should be dental physicians. But if, as we shall claim, the pathogenesis of dental caries is both local and systemic, then the province of the dental profession is co-extensive with that of general medicine; in fact, dentistry and medicine should co-operate

in an endeavor to secure sound teeth to future generations; and dentistry should have for its highest aim the prevention of caries.

The following statement by Dr. J. Leon Williams expresses, I think, a consensus of opinion entertained by the profession. After a most laborious and exhaustive treatise on the pathology of enamel, in which he explains in a masterly manner the *modus operandi* of caries, he said, "There seems no reason why any rational man should continue to doubt that acid-forming bacteria are the sole active cause of dental caries, or that the predisposing cause is to be found in that peculiar condition of the bodily juices and cells in which they are unable to repel the invasion of pathological micro-organisms."

It is upon this hypothesis, therefore, that we shall base our theory.

Having agreed that the cause of caries is both local and general, we shall next consider which influence is most potent. After this, we shall endeavor to determine which method of prophylaxis is or would be most effective and practical. It is a well-established fact that many forms of bacteria are often found in the mouth; that they excrete lactic acid; that this acid will sometimes and under some circumstances, if allowed to remain in actual contact with enamel, cause decay by offering, through its elementary substances, to the atoms of the enamel more inviting molecular attractions than the enamel molecules. In fact, it is claimed by many scientific investigators that dental caries is *never* accomplished except through the medium of bacterial excreta; and this may be true, but some intelligent and earnest thinkers have gone so far as to say that *environment is in itself* sufficient to cause caries, independent of disturbed vital relations. This statement we shall endeavor to disprove, and in this connection we shall also discuss another widely accepted, though equally erroneous, theory,—the statement that the oral cavity naturally affords an ideal hot-bed for the culture and propagation of a hundred different varieties of pathological micro-organisms. If this were true, wounds in the mouth would become septic. Instead of that, they heal more readily than anywhere on the body. Animals always bathe their wounds with their saliva, using their tongue as a sponge to cleanse and disinfect them.

Certain germs if placed in contact with healthy mucous membrane, will soon be destroyed, proving its germicidal properties.

Then, again, this destructive excrètum is being continually diluted with hundreds of its own volume of alkaline fluid from the mucous and salivary glands, which would make even the homeopathist question its activity.

I agree with Dr. Crawford that we are in danger of overestimating the fungi theory, or, as Dr. Barrett designates it, the "vegetable fungi" theory.

Is it possible for the acid excreta of bacilli, with the surroundings which *necessarily compass* it, to have a catalytic effect on normal vital enamel? *We say it is not. Disturbed metabolism* depends on assimilation; assimilation depends on nutrition and digestion, as well as the psychological and physiological regimen. Lesions in connection with the fifth nerve may exert an inhibitory action on its nutritive function. We claim this as a logical reason for bilateral decay. It is not uncommon to see perfectly sound teeth from the mouths of very old persons whose alveoli and gums have been entirely destroyed by calcareous deposits, allowing them to fall out. Surely their environments afford as inviting media for germ culture as any other oral cavity, and that for a period extending perhaps over forty years. What is the source of their immunity?

The old plantation negro's teeth were the desire of all who saw them, yet he never so much as heard of a prophylactic tooth-brush or antiseptic dentifrice. But he had something better. Whole hominy and cornbread through the week and whole wheat biscuits on Sunday, with opossum and sweet potatoes in season. He had plenty of fresh air, outdoor exercise, and refreshing sleep. He had no cares, no responsibilities, no psychological problems. His duty was prescribed, his love-making simple, his religion complete. In fact, he was free, while his master was the slave.

We find almost the same condition among the savage races.

Let us consider briefly the dental organs of the primates. Apes' teeth offer the same anatomical inducement to micro-organic agencies as do man's, and, instead of keeping his mouth free from fermenting substances, he often uses his buccal pouches as a commissary depot for the storage of his food. We are persuaded to ascribe his immunity to an ideal regimen.

There is abundant evidence to convince us that the primary and predisposing cause, and therefore the most potent factor, in dental caries is *lack of vital resistance* in the *cell life*.

Upon this fact, therefore, is based the rationale of systemic hygienesis. But is it practical? We will offer a few suggestions under the following heads: Dietetic, physiologic, and psychologic influences.

As to diet, the menu should be liberal, and consist of cereals, meats, and fruits, to suit the individual taste and digestive organs. Idiosyncrasies must be observed. The cereals should contain as nearly as possible the natural constituents of the grain, thoroughly cooked, and served in a manner that will afford the teeth, gums, mucous membranes, and muscles of mastication hearty exercise, thus assuring abundant admixture of air, and fluid from the mucous and salivary glands. The food should be taken leisurely, and with mental relaxation. Drinks should be free from stimulants, and be taken separately, especially if their temperature is high or low enough to interfere with the action of the ptyalin in the saliva.

Physical auxiliaries: Daily exercise in the open air and sunlight, if possible; deep, full inspiration taken through the nose; regular baths; regular meals; early to bed, early to rise; cozy, but well-ventilated apartments; common sense apparel, and temperance in all things; the proper filling of any decayed teeth or restoring lost ones, so as to properly perform mastication.

Psychological influences: Systematic, but not inordinate, study. Avoid uncongenial mental labor, gloomy surroundings, immoral companions, or melancholy meditations. A pleasant disposition, agreeable associations, and a clear conscience has a wonderful influence on digestion, nutrition, assimilation, and metabolism, and normal metabolism gives immunity from caries as much as it does from any other physical disease.

DISCUSSION.

Dr. L. M. Cowardin: Mr. President and gentlemen, the field of dental hygiene is a broad and important one, and it is not possible to discuss it properly at this time, the time for adjournment being so near. If all adhered strictly to nature's laws we should not be the sufferers. We are the products of civilization, and that is why we suffer from decayed teeth.

Nature provides the ape with the means of protecting his teeth from decay if he lives a natural life. But if the ape is domesticated his teeth will decay. It is not strange that we have decayed teeth,

but rather that we do not have decayed everything else as well, since the manner in which we live is unnatural. The theory in regard to vitality or the vital force is erroneous to some extent. I agree with Dr. Black that the teeth do not have within themselves any power (vitality) of repelling decay. I do not find that teeth from which the pulps have been removed decay any more rapidly than those with the pulp in healthy condition and performing all its functions. The teeth are a negative in the process called caries; they give expression to disease that has originated elsewhere. The essayist has shown admirable ability and thoughtfulness in the expression of his views, in some of which, however, I cannot agree with him.

Dr. J. Y. Crawford: I desire to express my thanks for the paper we have listened to. He has stated that he considers himself a disciple of mine; that I am in a measure responsible for his views. I will say that I consider that one of the greatest compliments I have ever received. There is great hope for the future development of dentistry in the South. The paper is beautifully written. It is classical in metaphor. In the main, it is a good paper, though I do not agree with the author in all respects. As to the care of the sixth-year molars, the mouth of every child should be thoroughly examined by a competent dentist before the sixth-year molars make their appearance; and as soon as the crowns of these teeth are laid bare they should be washed and made perfectly clean, made aseptic, and the surface covered with a good cement, so that all imperfections may be thoroughly sealed. With this treatment and the teeth carefully watched, they will sometimes be good teeth for fifty years. In vicious cases, or if the cement washes out, it must be renewed as often as necessary. Keep them thoroughly cemented until those teeth have passed the period of susceptibility and they become immune to caries, with perfect grinding surfaces. These teeth are made up at a time of life which renders them peculiarly susceptible to caries; the grinding surface is frequently imperfect, and furnishes a fertile field for disease, but under the protecting cement the fissures calcify and the surface hardens. What was a virgin field for the implantation of disease germs becomes immune if properly protected. The doctrine of immunity is one of the profoundest doctrines in medical science. Jenner immortalized himself by one simple observation, which led

to the greatest gift to humanity, immunity from smallpox. I hope we are even now in the presence of the man who will make the discovery that shall lead to immunity from caries of the teeth.

Dr. J. P. Corley: Mr. President, I will not consume your time at this late hour, except to thank you for the kind reception accorded my paper. I will say, however, that the facts which the gentleman from Virginia has advanced as disproving my theory are the very facts which best support it; the simple fact that the teeth of the monkey decay when he is removed from his natural surroundings and habits of life proves the correctness of my theory. In regard to the vitality of the teeth, the gentleman overlooks the fact that the teeth are still possessed of vitality, even after the pulp has been removed; a pulpless tooth is not necessarily a dead tooth. It may do good service for many years, but when, from other causes than the loss of the pulp, it becomes really a dead tooth, then it is soon cast off. Nature will not tolerate dead tissues. As to the part that the saliva plays in connection with the teeth, it undoubtedly has prophylactic qualities, rendering inert what might otherwise be injurious, in contact with the teeth. But there is not time to enter into the discussion of this branch of this broad subject. I thank you for your attention.

Prosthetic Dentistry.

COMMITTEE No. 5, J. A. Dale, Nashville, Tenn., Chairman. No report from the Chairman.

The following papers were, in the absence of the authors, read by title and ordered published in the Transactions:

SECTIONAL BRIDGE-WORK.

By Dr. E. P. BEADLES, Danville, Va.

The method here described may not be new to most of you; but it has proved advantageous in my hands, and I give it for what it is worth.

Every experienced bridge-worker knows that all bridges should be made into as many sections as possible,—*i.e.*, each bridge should be as short as possible. There are several advantages in this,—greater strength is obtained; in case of breakage or accident, repair can more easily be made; such bridges are more easily cemented, etc.

To make the plan indicated plain, I will describe a particular case which I have recently completed. The anchorages consisted of the roots of the two centrals (upper), left lateral, second bicuspids, right and left, and second molars, right and left. The first bridge made and cemented was from left second molar to second bicuspid, each tooth being covered with a shell-crown. The bicuspid crown was made thin and with no cusps. This bridge being secure, the left lateral root was fitted with pin and cap and a *second* crown made to cover the already crowned left bicuspid, with a slot in the side to make room for the soldered attachment of bridge already in place. This bridge of left cuspid and first bicuspid was then cemented to place. Thus two bridges completed the work from

left lateral to second molar. The roots of the centrals were then prepared with pins and caps, also shell for second right bicuspid. This bridge carrying right lateral, right cuspid, and right first bicuspid was cemented to place. A second shell-crown to cover right bicuspid was made (with the cusps, of course, on this outer shell), and crown made for the second molar. This bridge, being completed, made the *fourth* for this case, which, as is seen, is nearly an entire upper.

This principle of making two shell-crowns for the same tooth, one being the end of one bridge, the other being the beginning of another, I believe to be correct. It suggested itself to me less than a year ago, and I have used the same in several cases with a great deal of satisfaction.

A SUGGESTION IN BRIDGE-WORK.

By Dr. WM. H. COOKE, Denton, Texas.

To the Chairman Committee Prosthetic Dentistry: Becoming dissatisfied with facings or veneers for molars and bicuspids in bridge-work, I have, during the last twelve months, been using plain rubber teeth adjusted as per the accompanying specimen.

With a diamond disk a shoulder is cut below the pins much the same as the natural shoulder above them, and a thin backing of gold is burnished to the back and shoulders, extending to the masticating surface and beyond the apex of the gum portion and burnished over and around the end so as to form a cup in which the tooth sits. A sufficient amount of solder is flown over the backing to secure the necessary strength for mastication.

Is this good practice? If not, why not?

Fraudulent Colleges.

RESOLUTIONS submitted by Dr. B. Holly Smith:

WHEREAS, The Southern Dental Association recognizes the fact that under the loosely drawn statutes of some of the States of America it has been and still is possible to incorporate fraudulent dental and other colleges, and to obtain the certificate of the officers of State testifying to the legal regularity and status of institutions known to be openly selling different diplomas abroad without pretense of instruction; and

WHEREAS, We further recognize that such vending of our degree by such fraudulent colleges, and the wholesale flooding of European countries by counterfeit diplomas, has brought discredit upon the distinctive American degree of Doctor of Dental Surgery, and has induced special legislation against it in such countries, and made of it a badge of dishonor rather than honor in the estimation of many educated people; and,

WHEREAS, The good name of the dental profession of America is at stake, and we are held to our full share of responsibility for this condition by our *confrères* abroad; therefore, be it

Resolved, By the Southern Dental Association in annual meeting assembled, that we will as a society and as individual members of the profession do all that is within our power to obtain the repeal of any acts under which it is possible for irresponsible dental and other schools to become incorporated, and that we will spare neither time, labor, nor money in the suppression of those now in existence, and in bringing to condign punishment the villains engaged in counterfeiting our dental diplomas.

Resolved, That we heartily commend the action of the Foreign Relations Committee of the National Association of Dental Faculties in unearthing and making public the existing condition, and that we will sustain them to the utmost extent of our ability in their efforts to put a stop to the traffic in fraudulent diplomas.

DISCUSSION.

DR. W. C. BARRETT: In most of the countries of Europe it is now a penal offense to attempt to practice under cover of the distinctive American degree of D.D.S. The State of Illinois has upon its

statute books a law which is a disgrace to its civilization. It permits any three men to incorporate an institution that may issue any diplomas, practically without conditions, and the Secretary of State must, when called upon, certify to its legal respectability and status. Under this law, for less than five dollars each, an unknown number of charters have been issued to irresponsible men, some of whom are openly advertising for sale every known diploma. The National Association of Dental Faculties, through its Foreign Relations Committee, has commenced suits against some of them. One which is especially villainous has no less than eight of these charters, issued to it under different names, so that when one is enjoined it may use another. It openly advertises for sale thirty-six different degrees. Bills have been introduced into the Legislature to repeal this vicious law, and they are meeting with determined opposition at the hands of ignorant and evil-disposed men.

These fraudulent colleges have flooded Europe with these counterfeit diplomas, but it has only been within a very short time that they have been offered in America. As a consequence, nearly every country in Europe has legislated against the American degree, because it is impossible for them to distinguish the diplomas of our reputable schools from the even more pretentious disreputable ones.

Another disgrace to us lies in the fact that barbers, footmen, servants, and uneducated people in Europe have obtained from illegitimate sources certificates in a foreign language, purporting to show that they have spent one, two, or three years in some foreign dental school, unknown and unrecognized there or here, and certain of our colleges have, either in criminal carelessness or criminal ignorance, accepted them and given advanced standing on them, permitting their bearers to enter their senior class and graduate. Thus the servant of a dentist abroad has, in some instances, thrown up his situation, come to the United States, entered a college, and in less than six months returned to Europe and flaunted in the face of a man who spent three or four years in getting his qualification a diploma that would make the servant his equal and *confrère* before the world and the profession. It is scarcely to be wondered at that under such circumstances as these the American degree and the American dentist occupy but a low place in the esti-

mation of foreigners. Some of these men holding American degrees sign their name with the X mark, because they can neither read nor write. And yet they hold a diploma legalized by the laws of the State of Illinois, which has conferred upon them the degree of D.D.S. We bear the brand of Cain upon our brows, as being graduates from American colleges.

Because of this state of affairs, if the best dentist among you were to go to Europe and hang out your sign with the title D.D.S., he might be in jail in less than forty-eight hours. It is an awful situation. The National Association of Dental Faculties has taken the matter up, and it wants this Association to adopt these resolutions, and each one of you to exert what influence you can in developing public sentiment until such infamous laws are wiped from the statute books of every State where they are now in force, in Illinois especially. We want you to be fully awake to the peril of the situation; language cannot exaggerate it. The good work will inevitably be accomplished, but we need your help in it.

Dr. H. J. McKellops: There is an institution in Kansas City which is doing the same thing. We must break it up.

[The resolutions offered by Dr. B. Holly Smith were unanimously adopted.]

Dentists in the Army and Navy.

DETROIT, Feb. 7, 1899.

DR. W. E. WALKER, PRESIDENT S. BR. N. D. A., PASS CHRISTIAN, MISS.:

Dear Sir,—The Detroit Dental Society at its last monthly meeting passed resolutions recommending the appointment of dentists to the U. S. Army and Navy.

As Chairman of the Committee on Resolutions, I am requested to recommend that you bring the matter before your Society.

This is a matter of importance to the profession, and if we expect any action from Congress we must interest our Senators and Representatives. Therefore would it not be well to bring this matter before your Society at the earliest opportunity, if you have not done so already?

Very truly yours,

L. C. MOORE, D.D.S.,
112 Miami avenue.

Report of the Committee on Dentists in the Army and Navy.

Dr. B. Holly Smith: I feel embarrassed in being called upon for the report from this committee, as I am not the chairman of the committee, and am compelled to say that the chairman, Dr. J. A. Chapple, failed to call the committee together or to organize any work for the committee. He wrote, however, that he did not think the time propitious for work in this direction; that at a more opportune period he would open negotiations with the powers that be. At the Omaha meeting of the National body a special committee was appointed, and through their efforts and the efforts of other parties a bill was prepared calling for the appointment of one hundred dental surgeons with the rank of lieutenant, or some other such subordinate rank. In the House the feature was cut out from the army bill. There is still some hope from the Senate Committee, which now has the Hull bill under consideration, that the amendment concerning the appointment of dentists to the army and navy may be reinstated in the bill. The committee appointed by this body at its last meeting should have had the work so organized that our representatives in Congress would now be properly impressed with the importance of this matter and prepared to give it due consideration, and be ready to work for instead of against it. I mean no slur upon the chairman of this committee, who has undoubtedly overlooked the great importance of the matter. If every dentist in this country would use his personal interest with his Representative in Congress and with the Senators from his State, much could be accomplished. The time is right now. Strike while the iron is hot. I appeal to you, to each one of you, as a member of this Southern Branch Association, to communicate at once with your representatives in Congress, and beg them to look into the way in which our citizen-soldiers are being neglected.

Surgeon-General Sternberg is a personal friend of mine, and I had hoped to be able to get him to see this thing as we see it, but he thinks there is no chance for it now; that all the money that can be had is needed for other purposes. I do not see why a man who

can pass the State Board of Dental Examiners should not be able to stand the examination for the positions for which we are asking appointments.

Dr. H. J. McKellops: Any one who aspires to the position named must be thoroughly prepared to stand an examination in both medicine and dentistry. The men who are put forward for the position must be thoroughly competent. I do not see, however, why a man who can stand our State Board examination should not be able to pass for this position.

Dr. H. W. Morgan: Dr. Williams Donnally is the chairman of a committee appointed at Omaha last summer to work in this direction. He has made active investigations, and he assures us that the only way to obtain proper recognition from the general Government is to put ourselves on a level with the surgeons in the army. Unless we can pass the same examinations we cannot expect such appointments. If not on the same level, there would always be some conflict. Dr. Donnally is working actively to secure what is desired, and he desires that every dentist should make an appeal to the Senators from his State and the Representative from his district. I therefore ask of each one of you, as soon as you go home, to make an individual appeal to your representatives in Congress to support any measure advocated by this committee.

Dr. J. Y. Crawford: If we go at this thing we shall succeed, because it is eminently right and proper that we should succeed. If the proper line of argument is presented to our representatives in Congress they will see that it is their duty, and they are responsible to us for doing their duty. Any man who went through one of our military camps, and who saw what I saw at Chickamauga, will have an argument that no man can resist. When I saw those soldiers, I said there would be a howl raised in regard to the physical hardships they were forced to undergo. I saw enough then to convince any one who has sense enough to be a Congressman or a ward politician that it is the duty of the Government of the United States to appoint dental surgeons to the army and navy. Every Congressman who fails to support such a bill will fail to do his duty. There is a very small percentage of horses in the army compared with the number of men, and yet they have veterinary surgeons. Mortuary reports are made on the horse, and the veterinary surgeons have to send in their reports, and estimates are made of

their bearing on the reduced mortality among the horses of the army. But no estimate has ever been made of the decreased mortality among our young soldiers, which would be the case if properly qualified dental surgeons were attached to every regiment and stationed in every camp. No man has sense enough to be a member of Congress who cannot be made to see these things, or who cannot appreciate such evidence; and if he cannot see it he ought to be sent home.

Dr. T. M. Allen: I recently saw a statement to the effect that our soldiers in the late war suffered more from diseased teeth than from all other causes combined. The character of the food furnished to the army was poorly adapted to mastication with poor teeth. I hope this matter will be looked into, and our profession thoroughly worked up to the importance of the matter.

Dr. Laurence Leonard, Waseca, Minn.: In the Minnesota State Dental Society a special committee, of which I am chairman, has been appointed on this question, and it is doing some very effective work. We have gathered much valuable information, which will be laid before Congress. We have our report in good shape, and I can assure you that Minnesota is with you, shoulder to shoulder, in pushing this work. There is always considerable expense connected with committee work on legislation, and I believe that societies, city, State, and national, should contribute toward the actual expenses of their respective committees. I also think that the different State societies should keep in closer touch with each other, and also the National hold closer communication with the State societies.

Dr. V. E. Turner: I do not think that dentists as a rule are generally convinced of the importance and necessity of this movement. To accomplish anything pressure must be brought to bear upon our Representatives in Congress and our Senators to induce them to take this matter up and give it the attention it deserves. Our State societies should be notified of the required action and asked to bring their influence to bear. The importance of this matter should be brought to their attention. It is not necessary to discuss the question as to its importance. I move that the Secretary be instructed to request the State societies to co-operate with our committee in renewed efforts to have the desired bill passed.

[It was so ordered.]

Dentists in the Army and Navy.

By LAURENCE LEONARD, D.D.S.

THIS subject is now receiving more careful thought than it did in the past. Thought is like commodity, it is regulated by demand and supply. Heretofore our army and navy was small and stationed for long periods adjacent to our cities, where dentists were easily accessible; but in times of war, or when our army and navy are in activity or mobility, it is seldom possible to obtain the services of a dentist.

The amount of suffering from the teeth during the late war and the amount that is still being endured by our army and navy, scattered as it is in remote parts, has shown the necessity and has quickened sentiment in favor of dentists accompanying our troops.

Those who have seen actual service are practically unanimous in their opinion, and demand that something be done in this respect. To substantiate this statement the following testimonials are given. The three following letters are from Camp Thomas, Chickamauga, Ga., 1898:

Private Frank McLin (Fig. 1), who only spent six months in a dental office, on May 26 says, "When I return I shall be a full-fledged dentist. I purchased quite a few instruments in St. Paul before I left, together with a package of amalgam and cement, and am making good use of them. I extract from eight to ten teeth each day; am treating toothache and abscess, and I am doing lots of cement and amalgam filling." On June 14 the same private says, "I don't have as much time to work at dentistry as I should like to, and am going to try and get put on night duty (in hospital). This

way I can get a little sleep during the night, and then sleep forenoons and get a tent and work at dentistry in the afternoons."

Colonel Bobletter, on August 24, says, "The men of my regiment suffer a good deal from tooth trouble. The same occurred during the civil war. Many men suffered and lost valuable teeth, the loss of which no doubt affected their digestion, bowels, and health generally. I believe there should be qualified dentists in the army, say one to each regiment."

FIG. 1.

Private McLin's improvised dental office in camp.

Lieutenant Hodgkins, on August 28, says, "I have had trouble with my own teeth while here, and if it were not for a private who is doing a little dentistry in our company, who treated me, I would have lost valuable time and would have suffered considerable. I have noticed personally Lieutenant Drake, of Co. L, and a captain of the Fourth Ohio making trips to Chattanooga for the purpose of having their teeth fixed. In the best of my honest judgment there should be at least one commissioned dentist in every regiment."

The four following letters are from Lexington, Ky., 1898:

Captain Child, August 29, says, "I have noticed several in this camp suffering from toothache. It is an ailment from which a man dislikes to report sick, for if he does he is liable to be compelled to have the tooth extracted by the regimental surgeon, an opera-

tion which should not be performed while modern dentistry could so easily prevent it, and one which most of us dread when unskillfully done. In my opinion there should be a dentist with each regiment. It would give us fewer sick men, and hence a much larger fighting force to each company, regiment, brigade, etc."

Captain Griswold, who is also a dentist, on September 8 says, "On the salary a private gets he cannot afford 'dentists' bills,' and, if he could, he is only allowed to leave camp or garrison duty at long intervals, and feels that his leave is too precious to be spent in a dentist's chair. The result is that his teeth are neglected and decay progresses, until driven by pain he seeks the regimental surgeon, who is unskilled in this specialty, consequently breaks the tooth and mutilates the gum. When his tent-mates have toothache they prefer to stick it out rather than be butchered, and consequently are unfit for duty. How much better it would be if each regiment had its dentist, who, with a capable assistant, could help wonderfully from a physical standpoint to improve the army and naval service of the United States."

Private C. W. says, "This is to certify that I, C— W—, private, Co. —, Twelfth Regiment Volunteer Infantry, while in camp at Chickamauga, Lexington, and New Ulm, was afflicted with toothache, for which nothing but extraction by an army surgeon was offered for relief. Not wishing to lose my teeth, I was compelled to suffer, thereby losing many nights' sleep, which so incapacitated me for the duties assigned me that I was unable to properly attend guard duty. From my experience it is my belief that dentists should be appointed for the army. C—— W——."

Subscribed and sworn to before me this fourteenth day of December, A. D. 1898.

H—— C——,

[SEAL.] Notary Public.

Captain Edwards says, "I know that Private C— W— complained of toothache a good deal, and at Lexington, while on guard duty at General Sangher's headquarters, he was arrested for sleeping while on duty about 10 P.M. and sent to the regimental guardhouse. This was after orders had been received for the regiment to be mustered out. Charges were never preferred, and Private C— W— was never tried by court-martial, but was released by our commanding officer."

Here is a case where, in the face of an enemy, Private C— W— would have been shot. And for what? Simply because he would not have a valuable tooth extracted.

Dr. Fitzgerald, before sailing to Manila, said to Dr. Patten, D.D.S., "There is more tooth trouble in my regiment (the Thirteenth Minnesota) than any other one complaint."

The following is part of a letter from Major Boxton, D.D.S., a dentist who has been in practice in San Francisco for years: "My personal opinion is that the services of our profession are an absolute necessity for the comfort and health of the men. There are three dentists in Manila, one native and two Americans; if one of our men requires attention it takes almost a month's wages. The result is that they neglect the proper care of the oral cavity; their teeth are lost, the gums become diseased; the soldier is then unfit for service and is sent to the hospital, often to become a care on the Government for the balance of his life. I have known of a number of such cases, one man being sent home on account of the loss of teeth.

"I have had three different officers come to me for advice. Advice or a little iodin is the best they can get here at present. Many cases of fever and dysentery are brought about through a deranged condition of the oral cavity. There is no question about that fact, and all fair-minded army surgeons will admit it. All medical men that I have talked to on the subject admit that they cannot handle the work, and that it is very necessary to have dental surgeons in the service for the comfort and general health of the men. In my opinion there should be a dental surgeon with every regiment."

Lieut. L. M. Bunker, of the Thirteenth Minnesota Volunteer Infantry, says, "I think that in Manila they could use a few dentists in connection with the army to good advantage. There are a few dentists who enlisted as privates, but to my judgment they are entirely inadequate to the demands."

Why, then, are not dentists appointed to the army and navy? First, there is no law providing for such; second, it would require the passage of a bill for this purpose; third, as there is no one individual particularly interested, it would require strong sentiment throughout the United States to induce Congress to pass such a bill.

Where there are a number of influential individuals or corpora-

tions interested it is comparatively easy to get legislation, but where the petitioners are but poor privates and their pleader public sentiment the case is quite different indeed. However, something has been done. On the 4th of May last such a bill was introduced in the United States Senate, and was referred to the Committee on Military Affairs, where it and two similar bills are dying. What these bills need is the support of the dentists and their political friends, for without votes and political influence no bill can pass. The issue is gaining strength and popularity, and sooner or later will prevail as certain as truth is mighty. Individual dentists all over the country are laboring for it, and the following societies have unanimously demanded that dentists be appointed in the army and navy of the United States: The National Dental Association at its last meeting in Omaha, a number of the New York dental societies, the Minnesota and Ohio State Dental Societies, the Detroit City Dental Society, and a few others, which at this time have escaped my memory.

From these facts and many more not given here, which show beyond question or doubt the need of dentists in the army and navy, why have not the older countries conformed to this necessity? For instance, England and Germany have posed their armies as *par excellence*. In their desire to be perfect, why have they not included the dental surgeon, and thus give precedent for the younger country, America? Precedent, did I say? Precedent, ah, fatal barrier to progress! Precedent, thou opposite to originality and invention! One of the characteristics of the old world is precedent, while in its place America has adopted the effective rule, "quickest and best way to get there." Time waited long for the old countries to give us dental surgeons, but it waited in vain; it waited until Chapin A. Harris could restrain his convictions no longer, and without precedent (and it might be said money) established the first dental college in Baltimore, Md., in 1839, since which time, for sixty consecutive years, America has been not only the great light and teacher of dental science, but also the chief manufacturer of dental instruments and supplies. "He that hath much, much is expected of," and hence the world demands of America that she shall set the humane example of providing dentists for her army and navy. Yes, humane example, for America endeavors to be most humane toward her enlisted men. The flogging lash of

Europe is only just abandoned, and the human flesh upon it is scarcely dry; that flogging lash, the instrument of precedent, from the effects of which my own father has seen more than one man die during his five years' service on the vessel, "Her Majesty Thalia." Yes, we must look to the humanity, originality, and genius of America to give the needed care to her sons who bare their breasts for her defense, and to give to the world an original example, as we have always done, by appointing dentists in the army and navy.

The Necessity of Dentists in the Army and Navy.

By WALLACE WOOD, Jr., D.D.S.

THERE are no less than twenty-five thousand dentists in the United States, and about eight thousand assistants. There are also numerous villages, small hamlets, and remote townships, whose total population will exceed fifteen million people, who have no dentist, or to whom the services of a dentist are not procurable. There is also a population in the Southern and Western States (namely, negroes and Indians) which does not and never will need the services of a dental surgeon.

These figures, considered on a basis of a total population of seventy million in the United States, reduce the average number of dentists to the total available population of one dentist in every one thousand persons; and, as we know that only about one-half of the people patronize our profession, it might be stated one to five hundred. But as we know there are hundreds and hundreds of successful practitioners whose total yearly clientele does not exceed in number two hundred and fifty patients, it is therefore perfectly safe to state that to every three hundred average citizens a dentist could find ample and sufficient material to constantly occupy him in keeping their teeth in proper condition.

These facts alone, to say nothing of the absolute necessity, in the way of gross neglect and terrible suffering, should prompt every intelligent community to secure the services and assist in the support of a dental practitioner. These facts may be more applicable to the United States army and navy than to any other combination or contingent of American people, and it may be truly said

that there is no field anywhere to be found in more actual need of dental attention than in these two great bodies, both owing to character of food as well as to habits and to surroundings, but principally owing to location, they being generally removed from civilization or to some remote place.

There are many reasons why this unfortunate condition should be remedied, but none more glaring than the fact that one of the very first requirements to enlistment or appointment is good teeth, —those endowed by nature, and not artificial ones, no matter how good, how strong, or how perfect dental skill may make them. This is wrong, for many good and able men, both mentally and physically, are rejected each year at Annapolis and West Point, besides at many of the recruiting stations throughout the country, owing to some trivial dental abnormality which could be easily corrected by dental surgery; such, for instance, as the adaptation of dentures or bridge-work to replace missing molars, etc., which, according to reports, is one of the most frequent causes for rejection.

During our late war fully ten per cent. of the rejections at the recruiting stations were due to missing molars, or to the diseased condition of the teeth, and perhaps other associate lesions would double this amount. We will admit that no soldier nor sailor can be at his best and properly perform his functionary duties while suffering with diseased teeth; and this is one of the best arguments why this wanton neglect on the part of the Government toward her brave defenders should be changed. There is absolutely no provision on the part of the Government in this respect, except perhaps the application of the forceps, generally in unskilled hands, which, if applied too often, deprives and unfits the poor unfortunate for re-enlistment under the present laws, owing to the physical disability caused by the Government's own hand, through its ignorant or incapable surgeon or hospital steward to replace them. Perhaps the most practical reason to be offered in behalf of this movement is the inadequate pay of the enlisted man, whose small salary places the services of a reliable practitioner quite out of his reach. There are many other reasons that may be offered with equal consistency, but this is sufficient to show the actual necessity of bringing the attention of the proper authorities to the question that legislation may be effected, and thus afford relief to an evil which ignorance alone promotes.

So the question resolves itself to the manner or method of introduction into these bodies. This could be easily done under the direction of the medical department by the appointment of a board composed of dental professors from different colleges, for the purpose of examining applicants, who upon proper and satisfactory recommendation from this board could be appointed on and assigned to the medical staffs of the different corps, brigades, regiments, hospitals, garrisons, etc., where necessary, with corresponding rank one point below commanding officers in charge, thus giving rank, standing, dignity, and proportionate amount of pay, according to responsibilities.

This arrangement would greatly assist the medical department of the army, as all competent dentists, such as would be appointed, are practically graduates in medicine, and in emergency cases and wounds and injuries of the mouth and associate parts, which the dentist's special knowledge and skill especially qualify him to treat and manage, their assistance could be depended upon with greater degree of certainty than can the services of the present hospital steward, who frequently has no knowledge of medicine, and whose efficiency in the way of assistance is somewhat limited, owing to his many duties.

This same method of appointing dentists to the army with rank of commissioned officers could be applied as well to the navy, and probably with more success, as there seems to be a greater demand in this body for dental services than in the former, due to the confined life, character of food, lack of exercise, and general inability to resort to the dentist for relief when desired; for frequently large battleships and cruisers, etc., with complements of from two to five hundred officers and men, are absent from home, cruising in foreign waters, for a period of six months to three years, entirely without dental attention, and generally the ports visited either have no dentist, or they are not available when desired, owing to the stringent rules against short-leave and inadequate time, to say nothing of the exorbitant prices to contend with, which the enlisted man cannot pay.

Legislation on this subject must be demanded by our societies, and this great deprivation of the benefits of one of our greatest sciences from our soldiers and sailors must be avoided and its advantages placed within their reach, which can be easily done by

simply creating a few additional captains and lieutenants in our army and navy.

This should appeal to you and to all interested in the advancement of dentistry, as well as to our patriotism for our country, and an effort should be made by our societies to attain this end by recommending that Congress be petitioned to adopt such measures as will eventually provide for this much-needed addition to her military service.

Germany is taking steps to provide her soldiers and sailors with dental attention at a reduced cost to the individual, and England is also looking into the matter pertaining to procuring the services of dentists in her army and navy, but as yet nothing has been done of any importance.

The United States, which leads the entire world in the scientific standard of dentistry, should be the first to offer her soldiers and sailors this humanitarian as well as philanthropic benefit, which could be done at a nominal expense, and thus place herself at the head of all nations as a leader of scientific progress and advancement.

These are all well-taken arguments, calculated for the benefit and welfare of our country, and legislation on this subject is demanded by actual necessity; and if the voice of our numerous societies could gain the ear of Congress it would soon be remedied, and American dentistry would once more surmount her pinnacle of fame and triumph over the rest of the world.

DISCUSSION.

Dr. H. J. Burkhart, President National Dental Association: Committees appointed by the National Dental Association and by this Southern Branch have had this matter in hand, and a bill was reported in the Congress calling for the appointment of one hundred dental surgeons in the army and navy. The bill was lost in the House, and is now in the hands of the Senate Committee, but the feature in which we are especially interested has been stricken out. The thing to be done now is to get in an amendment. But it has become a question of a money appropriation, and I doubt that we can hope for anything at this session.

Dr. James McManus, Hartford, Conn.: We have at least twenty thousand soldiers now in the Philippines. I learn that there is but

one dentist in Manila, and that the smallest amalgam filling costs ten dollars. What are our soldiers to do about their teeth? Not only the common soldiers, but the officers and their families, are liable to suffer. We ought to have dentists as well as physicians and general surgeons in the army. It is true the bill has been defeated in the House, but if every dentist would write to his district Representative and to the Senators from his State, making a personal, individual appeal, there would be some chance of something being done, but that is the only chance.

Dr. W. C. Barrett: There is still another side to this question. The appointment of dental surgeons in the army and navy would require a complete reorganization of the system upon which the army and navy is based. And that is not a thing that can be accomplished in a few months; it will require years. I am in favor of agitating the question, but we must abandon the fallacy that it is going to be easily or readily obtained. Reasons have been assigned for this that are unworthy of honorable men. Passing resolutions will do no harm, but it will accomplish nothing immediate. Do not remit your efforts, but if you expect any present results you will be disappointed as sure as to-morrow's daylight. But, even in the face of discouragement, let us go bravely on and keep up good courage.

Common Sense and the Status of the Dental Profession.

By Dr. E. P. BEADLES, Danville, Va.

THE dental profession (?) of to-day occupies an undefined position, some claiming that it is a branch and therefore a part of the medical profession. Others deny this, and claim for it absolute independence. There are those who say it is a dual profession, divided into professional men and mechanics, or operative and mechanical dentists. Again, there are those who say, and the census authorities seem to agree with these, that we are manufacturers. In most parts of Virginia dentists are excused from jury service, presumably because they are physicians, and are thus exempt. The judge in the town in which I live has recently been putting the names of dentists in the "jury box," and we are thus drawn for service. It seems to me that it would be better for all concerned to have our status clearly defined, and by the best authorities. If we are mechanics or manufacturers let it be known, and let us pay licenses accordingly; if physicians, let us be exempt from jury service and take our proper place. If the courts decide that we are physicians, then manifestly all so-called laws regulating the practice of dentistry are unnecessary and perhaps unconstitutional, as all who practice dentistry must pass the medical boards, which is the right and proper thing. One practitioner of the specialty of dentistry could be placed upon the medical board to examine upon the branches peculiar to dentistry, and the thing would be done.

In assessing dentists for license and in other ways the law seems to class them with physicians, as the license is the same in

each case. The great mistake was in ever establishing a separate dental school. A chair in the medical colleges for teaching this specialty would have saved us endless trouble, and the question before us would never have been raised.

I am in favor of an appropriation of a certain amount of money by this Association for the purpose of testing a case in the courts. Let us, if necessary, carry this question to the highest tribunals and get our status fixed by the highest court in the country, once for all. There will then be no more disputing. If we are to serve on juries, let us all serve. If we are simply skilled workmen, let us have the advantages of skilled workmen, and be relieved of the enormous license fees we have to pay in some States. I am opposed to paying for something which we do not get. I am opposed to occupying a false position. It is true that dentistry is more of a "profession" to-day than it was fifty years ago; all of the acknowledged professions had to have their beginning. Surely, if we are ever to be classed among them we have gotten far enough to be recognized by the law at least. We are not clamoring to be recognized by the medical *profession,* for they have a right to exclude whomsoever they please; but we are entitled to justice, and should not rest until we get it. If as said above, let us have the legal benefits; if we are skilled laborers, let us have the benefits accorded them.*

DISCUSSION.

Dr. Gordon White: This subject is one of greater importance to us as a profession than would appear at first sight, and I move that it be opened to discussion.

The Chair: The subject is open to discussion.

Dr. L. G. Noel: I do not feel competent to discuss the legal points involved, neither will I undertake to discuss the status of the dentist as to whether we are medical practitioners or mechanics. We are what we make ourselves. The medical profession has extended to us all the recognition possible, and they stand ready to welcome us to the highest positions we are competent to fill. It seems to me that the surest way to solve the jury difficulty is for dentists in each State to get a law passed settling the question forever.

*Since this paper was read before the Association, the judge here has decided that the writer is a physician and thus exempt from jury service.—E. P. B.

Dr. Joseph Bauer: In the Louisiana Society a member stated that in Louisiana dentists had to serve on the jury, but I think that is a mistake. I do not think that they have ever appealed to the Legislature for exemption, but I am sure that the general sentiment is that they are as much entitled to exemption as physicians. I feel satisfied that as practitioners of a specialty of medicine they are legally exempt.

Dr. H. J. McKellops: In Missouri the judges have refused to allow any dentist to be summoned on the jury.

Dr. T. C. West (Mississippi): I was once summoned on the jury, but said I would not serve, and I did not. I do not think we could be forced to serve.

Dr. L. M. Cowardin: In defense of the State of Virginia I desire to say that this is the first instance that has come to my knowledge in which a dentist has been summoned to serve on the jury. It is an exceptional case, and is certainly not customary in any other court in the State of Virginia.

Dr. T. M. Allen: All licensed dentists in Alabama are exempt from jury duty, though they can serve if they desire to do so. Licensed physicians, teachers, ministers, etc., are also exempt. When summoned they can claim exemption, which is always admitted.

Dr. R. D. Seals: The laws of Arkansas recognize the dental profession as a branch of surgery, and all reputable dentists are exempt from jury duty.

Dr. C. L. Alexander: There has been no special statute enacted in North Carolina exempting dentists from jury duty, but there is a statute exempting physicians; and the Supreme Court of North Carolina, in Hunter's case (60 N. C. Reports, p. 447), held that a "surgeon dentist" was a physician, in construing a statute substantially the same as the one exempting physicians from jury service. I have never heard of a dentist in North Carolina serving on a jury.

Dr. S. W. Foster: In the State of Georgia the law provides that dentists are exempt from jury duty.

The Relation of the Practice of Dentistry to the Theory of Dental Education.

By JAMES B. HODGKIN, D.D.S., Washington, D. C.

THERE are some things which are very near to the heart of every one loving the chosen calling of his life, and one of these is the relation of the practice of dentistry to the theory, as propounded by those who, sitting on the clouds above, essay to direct the work of education.

The question which "burns" me just now is, "Has the dental profession any rights which the dictators are bound to respect?" Have we, who do the work, any say in the matter of what shall be taught those who are to either keep step with us in the immediate future, or follow the steps we are making? For, as it would seem now, the regulation of colleges is as much a part of *politics* as the election of Senators or the appointment of a United States district judge.

It has been said that the colleges are what the public (opinion) makes them; that if there is complaint of management, of lack of theory or practice taught, it must come from the outside; that colleges themselves are incapable of originating anything, any reforms, any improvements, incapable of any growth.

It (this statement) is so injuriously unjust as not to merit serious consideration or notice even. Yet I have heard it made, and heard the claim made for the State and national boards that to them is due all progress, and but for them the colleges would be now (what many allege them to have been in the remoter past) machines for taking in money and issuing diplomas.

The "high standard" has been attained, the curriculum of the colleges is now all (?) that the "boards" ask for; at least they certainly

have it about their own way, and if the standard is *not* theoretically up to the "top notch" they are to blame. They have asked for and —no, that is wrong,—they have taken without the asking,—the whole question of teaching into their own hands, and the schools have had to take the "ordering" or take the guillotine.

So we have teaching on teaching; professors in theory, professors in practice, teachers of how to think about it, and teachers of how to do it; teachers of technics, who keep a drawing school, and teachers who are versed in the deepest mysteries of "bugology."

All this, too, in *three years.* When I think of the mental capacity of the student who has to become a physiologist and anatomist, a pathologist, a chemist, a bacteriologist, a microscopist, a ceramist, a master of drawing and artist in general, a pharmacologist, a modeler, a master of metallurgy, besides acquiring a knowledge of general and special pathology, of general and special surgery, of oral pathology and oral surgery (by the way, I will be glad if you can get a vote of the Association as to what constitutes oral surgery)—I think I have put down enough, but much more might be added—I say, when I think of the mental capacity implied in the dental student who is to acquire all this in the short space of three years (session of seven months) I feel somehow that this student, if he has acquired all this, has really mistaken his calling, and should have for his talents such scope and range as might possibly be found in the position of a cabinet officer, or possibly in the White House. But this "powerful mind" is to do more. He is to get such training of fingers and of eye as will fit him for such small work as filling teeth, extracting teeth, the manipulation of materials, the study of complex conditions of the constitution of his patients; he is to become an expert in what is confessedly one of the most difficult arts, dentistry.

From the first dental catalogue I have at hand I copy a few figures which make curious reading. All this anatomy, etc., is given to the students in instalments of one to two hours each three times a week, and in the total gives him, at eight hours per day, a total for the first college year of twenty-three working days. This for the first-year dental or medical class.

The second year these students attend a good many more lectures, possibly running up the total of days' work, counting this by the hour, making about fifty working days. The third year about the

same. This does not count in the dental laboratory or infirmary work. At the end of this (third) year the student is supposed to be in a position to graduate, and to know enough of all his studies to pass the State Board examiners (though whether these same examiners could change places with him is a doubtful matter); and so he passes "the State Board" and passes out of the range of our sight as a student.

How much, really and truly, does he know of the "fundamentals and preliminaries"? He is supposed to be able to dissect out the "fifth pair," to be able to make any bacterium culture, to be able to differentiate physiological conditions from conditions pathologic, to know two-thirds of what the medical graduate knows, to know diagnosis from head to tail, and to be able to fill teeth.

As Artemas Ward says, "the above is wrote sarcasticul," but it has a sober truth in it. What the student does acquire in this course of study is a mere surface knowledge, knowing nothing deep enough to be of real service to him. Could he do *any* of the things he professes to be taught the doing of? Call on any graduate to make for you an analysis (chemical) of anything, from amalgam to ptomaine, and will he be able to do it? Will not you, wishing to have the analysis made, send it to the expert?

I am met just here with the objection or comment on all this that no one expects the newly-fledged dental graduate to be an expert in these things; that at most he is to get a sort of insight into them, a little learning, a start, and that after his graduation he is supposed to be so in love with this sort of study as to make it a pursuit, —if not paramount in importance with his practice, at least a very important thing, and that he is supposed to complete in after-life what is commenced in college.

But does he? Ask of your graduates. I am sadly of opinion as to mine that the pursuit of pursuits which engages their attention, and which is of necessity the one pursuit of life, is the getting and keeping of a dental practice. And it comes more and more to me as a fact that so much time is taken from the life of the dental student in learning the theory of dentistry, as it is now taught, as to leave not sufficient time for learning the one thing he must do, if he is a real dentist,—the filling of teeth and work therewith associated.

I fret in vain, I suppose, but can I refrain from fretting when I consider that the time absolutely set aside for actual practice, for

the manipulation of filling-materials, the instrumentation, in the colleges of which I have knowledge, is only about twenty-eight working days?

That this may not be misunderstood, in the college the announcement of which is before me the second and third-year students only are required to take infirmary work (I say nothing of the other and more despised branch, prosthetic dentistry). Two hours thrice a week is required, equal to six hours a week, equal to twenty-four hours a month, and in a seven months' course the student has about one hundred and sixty-eight hours of practice, equal to about twenty-two days of eight hours each, certainly not more than one month. If other colleges do better than this I do not know, but the point I wish to make is that in a session lasting three years, each session seven months long, the actual training of hand and eye amounts to about a month of working days; in other words, the time, reduced to figures, gives the student one working month for dentistry proper out of nearly two years in college.

And yet this student knows that he must make his living not by being able to ferret out bacteria, or making chemical tests, nor even, fascinating as the pursuit may be, of making slides and sections for the microscope, but by the plain, every-day work of cutting out and filling up cavities. He sadly realizes as he is handed his diploma at the end of the course, that, although his memory is well filled with all these beautiful theories (than which nothing is more fascinating to the writer), he knows that of the work which is to fall to him to do, only about twenty-eight of the one hundred and fifty-three (less than half a year altogether) of the days spent in college were allowed him to learn his handiwork.

He was taught to draw, he was taught to make pictures of teeth, he was taught to make lantern-slides, he was taught to diagnose between the cholera bacillus and the bacillus anthrax (who was it who tells of the student who asked for a shewing of the bacillus ancillarius?); he was taught to analyze and to discriminate, to know the exact time when by evolution man lost his tail and became upright in position if not in character; he was taught the differences between the Mentone skull and that of Cæsar or Judah P. Benjamin; he was taught the evolution of teeth from the ape to his most modern descendant, man; taught all this, but of filling teeth?

Was it supposed by his teachers that the *mental training received*

in all these years of study would so develop the ego in him that he would need no special training in this?

Your plumber or house carpenter must learn his trade; your machinist who is to make the dental engine for you must spend years not so much in study, as in training the eye that guides the fingers, and in training the fingers; and the man to whom you intrust your watch for repairs, how delicate a touch he must acquire. But the man who is to fix your tooth,—he is sent from college with about five-sixths of his work spent on lines which are only remotely associated with the practical, and without which he could do so little proportion of the practical creditably; and one-sixth on practical dentistry.

I am not decrying learning. I do not believe there is a man who hears this to whom science is more fascinating than to me. It has been the dream of my life to be some day in position to lay aside work at the chair and take up dental science, spending the rest of my days in its mysteries; but I do realize this, that to the average prosaic man abstract science is not attractive, and its pursuit is less and less engrossing as work crowds on him.

How many of us have seen that modern martyr, the music pupil! How in pain and disgust she toils day after day over the piano, becoming after a time fairly proficient, but making music as soulless as a lead coffin. And how, just so soon as any occupation crowds the music, it drops as completely out of her life as any other disagreeable thing she no longer has to endure.

To the average dental student (and the medical is no whit better) so is our so-called dental science. A man must follow his calling. He must do that which brings him a living. Is it not time for us as teachers to be thinking, Have we gotten in the way of this man who is trying to learn to fill teeth by compelling him to take all the "ologies," not as a "condition precedent" to the study of dentistry, but as a study along with it?

If we are to do anything in the matter of "higher education," let us at all events not mix things. If men are to be men of science let us exact that of them before they enter our colleges, and when we teach dentistry let it be dentistry, and not all sciences combined.

I do not know when I was more saddened than a few days ago. A gentleman of my acquaintance, a graduate of three of the leading universities of this country (none of your so-called universities,

but such as Yale, Johns Hopkins, and the like), asked me to interest myself in obtaining him some pupils. His business was coaching students, and his terms were *sixty cents an hour.*

I had that morning sent a part of my dental chair to the machine shop for repairs, and the messenger asking what the cost would be got for answer that the time of the *machinist* would be counted at *sixty cents an hour.*

Good heavens! I thought, here is a man, scholarly, cultured, with certificates of competence from the highest schools in the land, and his pay the same as the competent machinist.

But enough of this, already too long, without being anything more than a mere ebullition of feeling on a subject about which I feel very deeply; in fact, possibly feel more than I can think.

Will you, my brethren of the Southern Branch of the National, think about all this, and ask yourselves, ask the art of which you are masters, are we really and truly on the right track in dental education?

Report of Publication Committee.

MR. CHAIRMAN and gentlemen, your Recording Secretary, as Chairman *ex-officio* of Publication, begs leave to state that, in accordance with the Constitution and By-Laws of the National Association (of which this body is a Branch), it has been beyond the province of your Secretary to control the publication of our Proceedings, as this provides that our Proceedings, including papers and discussions, are to be forwarded to the Publication Committee of the National, and are therefore not to be published under our immediate direction. After our last meeting at St. Augustine it became apparent that the material from that meeting, which contained more than twenty papers, with discussions, would be somewhat out of date if we withheld them entire from the press. Consequently, after communicating with our present honorable President and Dr. Fillebrown, President of the National, we sent to The S. S. White Dental Manufacturing Company about June 1 one-half of the Transactions, that this matter might begin to appear in the *Cosmos,* withholding the latter half, which I was satisfied would not be needed before the meeting of National in Omaha, the last of August and first of September. Soon after the adjournment of this meeting your worthy Assistant Secretary of National, Dr. Walker, wrote me to send him the Transactions of Southern Branch, as he had been directed to forward them to the Publication Committee of National. This, I believe, was about the third week in September. On October 6 I wrote to Mr. Hise, asking that the matter in their hands be returned in accordance with above request. Not hearing from them, I directed a second communication some weeks later, to which Mr. Hise replied that this matter was then in the hands of Dr. Kirk, who was at that time out of city, but on his return the matter would

be forwarded as ordered. I did not receive this matter. Some time in December I received a letter from Dr. Walker authorizing me to let the matter remain in *Cosmos* hands, asking me to urge that the Transactions appear before the present meeting. Accordingly on December 23 I shipped per express to *Cosmos* the remaining half of our matter, and wrote urging that these proceedings appear before the date of this meeting. I have not received a response from the *Cosmos* since this shipment, nor am I now able to give you any data as to when we may anticipate our Transactions. I regret that this state of affairs exists, but it is beyond the control of the Publication Committee of this Branch.

Respectfully submitted,

S. W. Foster, *Chairman ex-officio.*

Dr. S. W. Foster: I understand that propositions for the publication of our proceedings have been made through our President.

Dr. H. R. Jewett: According to the Constitution, we have not the right to publish our proceedings; therefore we have no right to receive any such propositions. I move that the Secretary's report be received. Carried.

The Chair (Vice-President T. P. Hinman occupying the chair): The Chair rules that as the Branch cannot publish its proceedings, it cannot receive any propositions on that point.

Dr. Walker: I appeal from the ruling of the Chair, and respectfully ask the Chair, before the ruling is made final, to read the section of the Constitution bearing on this point,—Section 5 of Article XIV, Constitution National Dental Association, found on page 12 (gentlemen will please help themselves from the Constitutions to be found on the table), and also found on page 22 of the Constitution of the Branch.

In the mean time I ask your permission to read a statement which I have prepared in reference to the non-publication of our Transactions of 1898. This package [holding up a thick package of letters] contains the letters to which marginal reference is made in the statement, which, with your permission, I will now read.

[At the conclusion of the reading Dr. Walker said,—]

If the volume of Transactions had been published and distributed among our members at the proper time, a great deal of labor and expense would have been spared. The attendance at the St. Augustine meeting was not large, and not having the Proceedings

many of you are even now in ignorance of what was done at that meeting. If they had been distributed among you, it would not have been necessary for me to send out so much matter giving information on essential points. As it was, I have had to keep a clerical force and a mimeograph machine busy for months. It is very clear that we want the proceedings of one meeting in print and distributed before we meet again a year later. After the discussion of the question of publication at our last meeting, I was disposed to accept as final the decision that our proceedings should be given to the Publication Committee of the National body, to first appear in a joint volume with the proceedings of that body to be held six months later. Recently, however, I have received a letter from the publisher of one of our dental journals which led me to give the matter more thought. More recently the following propositions have been submitted, with the request that they be presented for your consideration. I therefore ask your permission to read them.

[Permission being granted, Dr. Walker read as follows:]

Proposition submitted by R. Ottolengui:

New York, January 27, 1899.

Dr. Wm. Ernest Walker, President Southern Branch National Dental Association, Pass Christian, Miss.:

My dear Doctor.—Will you kindly lay the following proposition before the Executive Committee of your Society:

In the belief that it would be of interest to all the State Societies throughout the country to have the Transactions of the Southern Branch of the National in their hands by or before their summer meetings, I beg to state that I will be willing to devote one issue of our magazine—*Items of Interest*—to the publication of the Transactions complete, provided that the papers and reports of discussions could be placed in my hands with reasonable promptness; by this I mean that I would not be willing to give up one issue of our journal for the privilege of publishing the Transactions five or six months hence—my object being to get the matter out, if possible, by May 1, though I would prefer to publish as early as April, which could be done if everything were in my hands not later than March 5.

I would further agree to send the magazine containing the report of the meeting to every member of your Association, and also to furnish copies bound in cloth at the actual cost, to all who may desire it in that form.

If this proposition is accepted kindly notify me without delay, in order that I may make preparation, and especially let me know how quickly the matter can be furnished.

Very sincerely yours, R. Ottolengui,
Per B.

Proposition submitted by F. L. Hise, business manager of the *Dental Cosmos,* on the part of The S. S. White Dental Mfg. Co.:

We will undertake to print the report of the proceedings of this meeting on the following terms:

We will supply as many copies as are required, without cost to the Association; we will supply at our expense such illustrations as are needed, provided the material for same be delivered to us. We will send out proof within sixty days after completed report is delivered to us properly edited, and within sixty days after return of proof we will have it completed and ready for delivery to the members.

Should the printing of the Proceedings of the National Dental Association meeting at Niagara Falls be accorded to us we will also reprint the report of your Association in the volume, so that the entire Transactions may be available to all members in one volume.

It is understood that the matter of your report shall all be published in the *Dental Cosmos,* so far as it may be suited to that purpose in the judgment of the editor of that journal.

It is also understood that in case our proposition is accepted that journal shall have the exclusive right to publish your papers in full; but this is not intended to abridge the right of other journals to print abstracts of papers and reports, and such reports of the discussions as they may desire to make.

(Signed) THE S. S. WHITE DENTAL MFG. CO.,
Per F. L. HISE.

DR. WALKER: The Constitution provides that——.

THE CHAIR: If Dr. Walker will permit, the Secretary will please read Section 5 of Article XIV of the National Constitution.

The Secretary read as follows:

"Sec. 5. Each Branch shall furnish a copy of its proceedings, including papers and discussions, for publication with the Transactions of the National Association."

THE CHAIR: Gentlemen, I reverse my ruling. There is nothing in the Constitution of the National Association which prohibits a Branch from publishing its proceedings whenever it desires, provided a copy of the same is furnished, as read by the Secretary; printed or unprinted, as may be most convenient.

DR. CRAWFORD: I move that the whole subject be laid on the table.

DR. H. W. MORGAN: I offer as a substitute for Dr. Crawford's motion that the matter be referred to the Publication Committee, and I desire to make an explanation. I am very sorry that the corrected proof is not here. The proof came into my hands a week ago last Sunday, and I immediately corrected it and removed the obnoxious foot-note to the end of the membership list of the

Southern Branch. One of the difficulties encountered was that I had no means of ascertaining who was actually present at Omaha, though I wished to indicate properly the class to which each member belonged. I think we will get a full alphabetical list of all the members, but from time to time, one after another, members are sending in their dues, so that it has not yet been possible to say that the list is complete. There were no doubt many inaccuracies, and many corrections have been made. I mailed the corrected proof myself at eleven o'clock Sunday night. I hoped to have received the revision before I came here, but did not.

Dr. Jewett: I am in favor of the original resolution, to lay on the table. This thing may get us into complications that it may not be easy to get out of; better go slow, and not act until after more deliberation.

Dr. T. M. Allen: I am in favor of the substitute. When we met last year the proceedings of our previous meeting were not in print, and many of us were in ignorance of what had been done at Old Point Comfort. We meet this year, and again our proceedings, now a year old, are not in print. What guarantee have we that it will not always be the same?

Dr. Morgan: I renew my motion, as a substitute for that of Dr. Crawford, that the whole matter be referred to the Publication Committee; they can decide what is the best thing to be done.

Calls for "question." The substitute was adopted.

Publication Committee, after carefully considering the above propositions, agreed to publish Transactions, and accepted the offer made by Mr. Hise, of the *Cosmos*. Manuscript forwarded complete April 3.

S. W. Foster,
W. E. Walker,
L. G. Noel,
Publication Committee.

Dentistry of the Past and Present.

By Dr. JAMES S. KNAPP, New Orleans, La.

MR. President, Gentlemen, and Members of the Southern Branch of the National Dental Association: Though the subject to which I was assigned to write a paper to read before this august and learned body was dental prosthesis, I felt a diffidence to undertake a theme so far beyond my taste and ability.

On being urged by letters from some dentists of prominence, as well as members of committees of this the Southern Branch of the National Dental Association, to write and read what I chose, I concluded to give you some remarks concerning olden-time dentists and the dentistry as practiced by them in the city of New Orleans and elsewhere, and make some comments on the status of the dental profession in some of the Southern States, including the cotton and sugar State of Louisiana.

The Eastern and Middle States are known to have developed some of the first persons who gave their attention principally to the extraction of teeth and replacing lost dental organs with substitutes, the best they could find or devise.

Very little did these early practitioners know or attempt to learn of the art of filling and preserving the natural teeth, and they joined their efforts at extracting teeth and inserting others in their stead to a limited knowledge and practice of clock- and watch-making, jewelry, and repairing the same, to their dental work done in the rather rude and primitive manner in which they practiced dentistry.

A few had read some medical books, usually with an older practitioner; and these probably performed their dental work the best,

especially if something like watch- or clock-making or jewelry had engaged their attention enough for them to acquire dexterity in the use of small tools and implements of small industries.

These persons gradually learned to make their own dental instruments from either the tools used by saddlers or shoemakers, if they enlarged their field of work so as to embrace something in the way of cleaning or filling teeth with lead or tin foil. The latter, I have been told, they obtained on the inside of old Chinese tea chests or boxes, the Celestials being ignorant of the utility to which some of their metallic linings would be put.

In extracting, the key instrument, with its two or three extra hooks, was in general use. About the period of 1805 to 1810 the French and English brought to American cities, as New York, Boston, and Philadelphia, some so-called improved keys such as surgeons used, and of which teeth extractors in the cities mentioned, if able, availed themselves.

The keys were usually employed by practicing physicians and surgeons, to whom the removing or pulling of teeth, as it was called, was generally relegated.

I need not remind you, intelligent gentlemen, of the terrible injuries, fractures, and unnecessary pains that were inflicted on the poor sufferers who submitted to the use of this frightful instrument, with its hard-pressing fulcrum resting on the alveolus, or rather on its superimposing gum near the tooth to be extracted, and its badly-fitting hook clasping against the offending member on the opposite side, while the strong and dextrous turn given to the ivory handle by the hand of the operator illustrated a power quite sufficient to either break the crown or crush the alveolus, which had till this time retained the tooth in its socket.

You see I make no attempt to speak of dentistry among the ancient Egyptians or the mummies of Thebes, in which teeth filled with gold attest the fact that even at that early period something was known of the "art preservative" of the human teeth; but I begin with dentists and dentistry as far back as known in the history of the American colonies of Great Britain and the United States of America.

Previous to 1776 no dentists (so called) were to be found in this country, nor were forceps, punch, or elevator in use.

In the time of Dr. Randall, who died in 1840, forceps were not

known as an article of commerce. Mr. Woofendale, pupil of Mr. Thomas Bardmore, of London, arrived in New York in 1776. There was so little demand for his services in a line in which their ignorance was so great that he could not make a living, and he returned to London, England, in 1778.

Next we hear of Dr. Joseph Le Maire, of whom Dr. James Gardette, of Philadelphia, speaks as an eminent dentist in 1774. Isaac Greenwood was the first dentist who practiced in Boston before 1774, at which date his son, Dr. John Greenwood, commenced practice. He was the dentist of General Washington, and made several dentures for the "father of his country."

I have been told by a son of one who lived in the time of Washington, who knew him well, that the General was much troubled with these artificial appliances, as probably were others for whom artificial teeth were inserted about that time and for years afterward, the plates being carved from ivory, as were the teeth carved in a like manner from like material.

Josiah Flagg next appears as an itinerant dentist in 1785. According to his advertisement, he "sews up hair lips, fixes good roofs and plates to assist in pronouncing and swallowing."

In 1778 James Gardette, a surgeon in the French army, settled in New York, but removed to Philadelphia, where he continued from 1784 for forty-five years. He first applied the principle of "suction," or "atmospheric pressure." Horace Hayden commenced practice in Baltimore in 1840 when thirty years old. He realized that those who expected to practice dentistry should study anatomy, physiology, chemistry, and metallurgy, especially the nature and working of steel, gold, and silver. He joined a number of gentlemen in petitioning the Legislature of Maryland to aid in the establishment of a dental college, the faculty of which should be composed in part of practitioners of medicine and in part practitioners of dentistry. Dr. Chapin A. Harris was the dean and professor of theory and practice, and had more to do in the development of this college and its success than any other man. He was the well-known author of the best text-book on dentistry for general information ever written. His successor, Dr. F. J. S. Gorgas, was such a worthy successor and possessed such a remarkable ability as dean and instructor that there was no diminution in the prosperity of the oldest dental college in the world.

The Maryland Dental College, also located in Baltimore, has shown great success under the wise and efficient management, as dean and professor, of the kind-hearted and lamented Dr. R. B. Winder. Dental colleges in Philadelphia, New York, Atlanta, Nashville, and some other cities have done much good in raising the standard of dental education and preparing students theoretically for practice.

It is, however, to be regretted that many who attended and became graduates are not fitted by previous education and by natural aptitude to become excellent operators. It is also to be acknowledged that some have become dental operators of the highest skill who never enjoyed the advantages of a dental or of any other kind of college education.

With the establishment of dental colleges came improvements in the manufacture of artificial teeth, dental materials, and instruments.

Up to the development of dental work as taught in the first dental college, human teeth were often used in the place of decayed crowns of front teeth the roots of which were considered strong enough to do duty of holding a new (old) crown, or artificial teeth were made of bone, tusks of elephants, hippopotamus, or other ivories. If one was lost from the ivory base, it was replaced by another of the same sort. Teeth of cattle and sheep were also used till the manufacture of porcelain teeth made such substitutes no longer necessary.

A custom prevailed in England from two hundred and fifty till fifty years ago of transplanting teeth from the mouth of one person to that of another. For instance, a gentleman of means about to lose any one of his front teeth having a single root, would have brought to him by his surgeon several persons of the poorer class who were each possessed of teeth about the same size and color as those of the rich man, who were satisfied to sell their teeth for a pecuniary consideration.

The surgeon, after removing the condemned tooth from the purchaser, would take out the corresponding tooth of the seller of an important part of his anatomy. It is needless to say that the surgeon would take out from three to six teeth before finding one that would fit in size, length, and appearance. All that suffered a tooth or two to be removed for trial were paid from half a crown to a

crown each, according to agreement. Of course the transplanted tooth had to be ligated to its new neighbors till firm in its new socket.

This English custom was not a common one, and only prevailed among those who were rich without heart on the one side and those who were ignorant and without money on the other.

It is to be hoped that the teeth thus selected were from the mouths of individuals who were in perfect health, otherwise the rich might have bought more than their bargain demanded.

Nor is it to be supposed that this mode of practice, borrowed from the mother country, was pursued to any great extent in the "new world." Certain it is that Le Maire advertised, offering two guineas each for sound teeth to persons disposed to sell their front natural teeth, perhaps aiding them to keep out of the army.

In 1814 Benjamin Jones, in order to make an improvement in pivot teeth, which were theretofore attached to the root by a metallic screw, caused them to be held to the root by using a strong kind of wood for that purpose. We are not informed if the wood was previously compressed.

Porcelain teeth were made and used in France as early as 1774, but were not known in this country till they were brought here by Dr. A. A. Plantou, who arrived in Philadelphia in 1817. Those were of crude manufacture, bad color, and unnatural in shape; and if they could now be brought before you and placed beside those made by Stockton, of Philadelphia, or those by Crowfoot fifty years ago, the teeth brought from France, or any teeth made in this country in 1846, would be found far superior in appearance and in strength and capacity to stand fire in soldering. Dr. A. A. Plantou commenced the manufacture of porcelain teeth in 1819, two years after his arrival in Philadelphia from la belle France; and in 1822 he exhibited his work before the medical society and obtained a certificate of approbation.

Next we learn that Charles W. Peale made teeth with holes through them so that they could be riveted to the base on which they stood. He soon after made them with platinum wire placed in them before fusing in the oven.

Samuel Stockton commenced experimenting in 1825, and made so many improvements that in 1840 to 1850 those of his make were in high repute; few were as good.

Many dentists from 1825 to 1840 took some lessons from manufacturers of porcelain teeth, and made all the teeth they used in their practice. Dr. Frederick H. Knapp was then a resident of Baltimore, and was among the number. James Alcock, also D. C. Ambler, established themselves as large manufacturers, and were contemporary with Mr. Stockton. Elias Wildman, of Philadelphia, first reduced the manufacture of teeth to a scientific basis, making them more life-like in appearance than any previously made except those made by Crowfoot, of Hartford, Conn.

In 1844 S. S. White commenced in a small way the manufacture of porcelain teeth in a garret of a dwelling at the corner of Seventh and Race streets, Philadelphia.

His improvements were numerous and valuable, and have reached apparently so near absolute perfection it is difficult to conceive how they could be excelled. The variety of dental goods in his large depot in Philadelphia and his branch houses in several other cities is the result of close study and application to place before the dental profession everything they needed to make a perfect outfit of furniture, instruments, and materials for both office and laboratory.

One secret of his unparalleled success is found in his becoming in many cases the owner of useful inventions devised by different members of the dental profession, coupled with good judgment, energy, and strict integrity of character.

H. D. Justi, of Philadelphia, obtained in Germany a thorough knowledge of working metals, especially steel; hence it is plain to see how he was so skillful in making such excellent dental instruments, and his knowledge of making natural-looking and serviceable teeth is probably unsurpassed. Justi, we are informed, was the first of the dental manufacturers to make suitable molds and bake teeth in sections or blocks. The year 1855 had arrived when there had been but one kind of teeth made, and that is teeth intended to be set on gold or silver plate. Then in that year the rubber base was introduced, which revolutionized the business of teeth manufacture, for different forms of the posterior parts of the teeth were required, to say nothing of a change in the form and arrangement of the platinum pins. Colors of teeth were imperfect till plenty of work and experiments resulted in great improvement.

Dr. Gardette was the first to introduce gold as a base for artifi-

cial teeth. Charles Goodyear and some others experimented with gutta-percha in 1851, and in 1855 Goodyear obtained his first patent for dental hard rubber as a base in England. He secured the teeth in position before the rubber was vulcanized. So, you see, gold, silver, vulcanite, celluloid, and platinum were used.

The name of one man eminent in the dental profession, the like of whose work most of you have never seen, should not be forgotten, for Dr. John Allen, of New York, was truly the inventor of continuous-gum work, the gum material being fused around the base or necks of teeth already secured to the plate of platinum, which latter material required a higher heat to melt it than the superimposed continuous-gum. See the perfect cleanliness of such a piece of work, perfectly free from cracks or semblance of a fissure from end to end. But the time and difficulty encountered in making it, and the trouble of repairing it if broken, made it expensive, so its better appearance over rubber did not make it a rival of the latter cheaper and more easily worked material. Among the few who learned Allen's continuous-gum work were some in Boston, New York, Philadelphia, and St. Louis; Dr. John S. Clark and Dr. Geo. J. Friedrichs, of New Orleans, also Dr. Ansel A. Morgan, of Rochester, and his partner, Dr. William J. Lawrence, formerly of Otsego county, New York, who together in Rochester made quite a good number of whole sets of teeth about 1852 and 1853 of this beautiful and newly invented style of work, which had gained considerable renown for its author.

In 1880 Gideon Sibley commenced the manufacture of teeth and instruments, in each branch of which his work is not excelled for beauty of form and utility.

In recounting dentists in American cities it is not well for us to forget the brothers Tucker, the Hitchcocks and Shepard, of Boston, who figured in that city of "rye and Indian bread," "apple pie and baked beans."

About 1845 to 1865, or longer, the Drs. Arrington, of Jackson and Memphis, Tenn.; Parmlys, of New York and New Orleans; the Drs. Atkinson, E. Parmly Brown, and E. A. Bogue, also of the city of "Gotham," nor the name of Dr. Norman W. Kingsley, of the same place, more skilled in artificial palates than any living man; nor will we forget La Roque, Chapin A. Harris, and Le Maire, of Baltimore; Drs. Arthur, White, and the Townsends, of

Philadelphia, for their skill and their writings; Dr. F. H. Badger, of Columbia; the Drs. Morgan, of Nashville, Tenn., distinguished for their teaching and their work; Dr. James Taylor, of Cincinnati; Drs. Spaulding, Benton, Homer Judd, and the Morrisons, also of St. Louis, and Dr. McKellops, the quality of whose work in treating teeth and preserving them with artistically worked gold has never been excelled.

We should not fail to remember Dr. E. K. Maynard, of Washington, D. C., who first treated and successfully filled nerve-canals, and who in the earlier years of his career visited St. Petersburg and operated for the Czar and the Imperial family, as well as many of the nobility, often receiving magnificent presents of far greater value than any fee he would have charged. Their kind appreciation of his work, he said, was sufficient recompense for the best efforts he could make.

Neither last nor least we mention the good old Dr. Goddard, of Louisville, the worthy treasurer of the old American Dental Association, and Dr. John S. Clark and his worthy and skillful student and partner, Dr. George J. Friedrichs, of New Orleans, the latter gentleman being still with us, and his son, Dr. Andrew G. Friedrichs, teacher in the Charity Hospital and operator in the "Senses Hospital" and curing many difficult cases, exhibiting his great skill in oral surgery.

And I will venture to add the name of Dr. F. H. Knapp, of this city, who died in 1883, and who probably operated for more distinguished persons, as Henry Clay, Andrew Jackson, and Bishop Polk, than was the lot of any dentist in the Crescent City.

I will not mention names, but there is a very small number of dentists now practicing in this city who are able to execute as fine and durable work as was ever done before their time, and, for one, I am glad that they command good pay and stand up for the intelligence and the honor of the dental profession.

One who practiced in this city, from my native State, New York, for many years, who, besides being affable and kind-hearted, and so industrious that he would hardly give himself time to rest, was successful in making artificial dentures where others had failed, was called to his long home five years ago. I mean Dr. Charles E. Kells. His worthy and skillful son remains, and is an honor to the profession he practices so well.

The population of New Orleans, though increasing slowly compared to the increase of some other cities, has enlarged about one hundred thousand since the reader of this paper settled himself in the Crescent City, and the amount of dental work has also increased probably more in proportion than the inhabitants. I am sorry to say that in my opinion the quality of work, excepting crown- and bridge-work, is, on the average, no better than it was fifty years ago. This shows that the "newcomers" who turn off artificial teeth and fillings of all kinds by the wholesale so rapidly are obliged to conform to the low rate of prices they charge and the false notions of the many ignorant persons who patronize them concerning the noble profession in which these men slight their work, and of which they make a degraded trade.

Hear what Josiah Wedgwood said:

"All works of taste must bear a proportion to the skill, taste, time, expense, and risk attending their invention and manufacture. Those things called dear are, when justly estimated, the cheapest; they are attended with much less profit to the artist than those which everybody calls cheap. Beautiful forms and compositions are not made by chance, nor can they ever, in any material, be made at small expense. A competition for cheapness, and not for excellence of workmanship, is the most frequent and certain cause of the rapid decay and entire destruction of arts and manufactures."

I believe that the practice of dentistry should be restricted to those who become well qualified, and that it could be regulated by law.

The efforts that were put forth by a few dentists one year ago were not successful before the Louisiana Legislature because not enough aided the good cause, be it said to the disgrace of the sleepy-head dentists of this State as a class.

But if it is so difficult to make a perfectly fair and just law, I recommend that all persons who unnecessarily lose their natural teeth should institute suits for damages against those who caused them. The consent of the patient when about to suffer the loss should not make them fail in the suit, because the surgeon knows what ought to be done, and he is not justified in assenting to the whim of his ignorant patient.

Among the vast number of teeth extracted there is a large proportion taken out and thrown away which could have been saved,

and the proprietors of these large dental slaughter-houses should be held accountable for the damages.

Dentists, or rather these clap-trap advertisers, endeavor to shirk the responsibility of being the cause of the loss of a number of good and well-placed natural teeth because the patient strongly desired to have them removed, but all, or nearly all, of these to whom I have just alluded acted not on their knowledge of right and wrong, but in a way to *make the most money*. There are dentists who are men of principle, who will perform on the teeth with correctness of judgment, even though their remuneration is less than it would be if they acquiesced with their patient's first expressed desire.

But I think now of one to whose memory I have not called your attention; I refer to the justly distinguished and honored American dentist who resided and practiced his profession in the great French capital for more than half a century, who died November 15, 1897. You all know I speak of Dr. Thomas W. Evans.

He came to Philadelphia with the remains of his estimable wife, and after seeing the mortal remains of his loving companion interred in the beautiful tomb he had constructed, he returned to New York and then to the great Parisian capital, the city of his adoption, without children, bereft of his life-time friend, from the shock of whose death he never recovered. He died lamented by all who knew him November 15, 1897, of angina pectoris, after an illness of only twenty-four hours.

He was undoubtedly possessed of the highest order of skill in both mechanical and operative dentistry. The evidences of his superior ability in manipulating gold were especially noticed, as they were shown at a fair in Philadelphia about the year 1845.

Two prominent gentlemen who resided in Paris attended the fair and sought the author of the beautiful work they so much admired, and at their instigation and advice he went in 1846 to the famous French capital, where a few American, French, and English dentists had already made themselves somewhat known in that wonderful city. Among them was Dr. C. Starr Brewster, I believe a native of Massachusetts, but who had previous to going to Paris resided and practiced in Charleston, S. C. He appreciated the talent of Dr. Evans, and the two made arrangements to become mutually interested in dental practice for a year, when Dr. Brewster,

having in the years he had practiced in that locality acquired a fair competence, left the field of practice to Dr. Evans, but retained for a time an interest in the office.

It is needless for me to say that the skill of Dr. Evans, which was greater than that of his predecessor, and his great and increasing popularity insured him a train of unexampled prosperity.

This was more markedly apparent when Napoleon III. formed his acquaintance and introduced him not only to many of the nobility of France, but to crowned heads of other governments, for whom Dr. Evans operated; and, indeed, it is said he rendered his professional services to every crowned head in Europe except the then Sultan of Turkey and the exalted and most worthy and venerable Queen Victoria. There is no doubt he would have been solicited to operate for the good old lady if he had only been "English, you know."

But the good fees he received from the class of persons for whom he operated constituted but the nucleus of the great wealth that attended his efforts in American securities during the Civil War and in real estate. Napoleon knew what streets were to be opened or enlarged, and gave to his honest and talented friend the benefit of knowledge which caused him to become many times a more wealthy millionaire dentist than Eleazar Parmly, of New York city. The wealthy lady, wife of the latter, who was at that time called wealthy, if living now, would not be deemed rich; and it was not in her power to push her husband into immense wealth as Dr. Evans with an Emperor to back him rose in distinction and in worldly possessions in Paris and in New York city, aggregating thirty-two millions of dollars.

Dr. Evans was kind and generous to the poor, and his was the light that led some of his Pennsylvania relations to come and assist him in the arduous labors of his profession, and enable them to share the honors and enjoy the comforts and blessings of a prosperous and profitable occupation; and we should be glad to know that, by his will, some who were left in that good old Keystone State struggling for a poor living feel that a near relative had remembered them by his kind and generous acts.

This must not make us forget his love for his profession when he was disposed to assist some dental colleges in America, as well as institutions of learning and works of benevolence in the land

that gave him birth. But he became justly noted for his kind and daring benevolence in assisting the Empress Eugenie to leave Paris when her life was in danger when, after the failure to gain the battle of Sedan, Napoleon's name was cried down and the rabble and mob shouted, "Death to the Spaniard;" and when he conveyed the frightened lady to a railway station (Dauville) sixty miles distant from the excited masses of the French capital, and there under the escort of Sir John Burgoyne she could go by rail to the French port and then pursue her journey by steamer across the channel to English soil, where she could enjoy the security of English protection and English law.

Thanking you for your kind attention.